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PROPOSED
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BACKGROUND DOCUMENT

FOR WASTEWATERS CONTAINING
BDAT LIST CONSTITUENTS

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DATABASE KEY

BDAT	Best Demonstrated Available Technology
ITD	Industrial Technology Division
NPDES	National Pollutant Discharge Elimination System
WAO	Wet Air Oxidation
WERL	Water Engineering Research Laboratory
OCPSF	Organic Chemicals, Plastics, and Synthetic Fibers
CMDB	Combined Metals Database

1.0 INTRODUCTION

In accordance with the amendments to the Resource Conservation and Recovery Act (RCRA) of 1976, enacted in the Hazardous and Solid Waste Amendments (HSWA) of November 8, 1984, the Environmental Protection Agency (EPA) is proposing best demonstrated available technology (BDAT) treatment standards for all BDAT List constituents in wastewater matrices. These BDAT wastewater standards would apply to leachates and other wastewaters not already regulated by BDAT wastewater standards as promulgated or proposed in the first, second, and third third rulemaking efforts. In addition, these standards may also be used as a guide to permit writers for determination of BDAT for any given BDAT List constituent present in a wastewater.

This background document presents a technical database of wastewater treatment performance data for BDAT List constituents. In addition, this document provides the Agency's rationale and technical support for selecting specific treatment performance data for use in calculating a BDAT wastewater treatment standard for each BDAT List constituent.

The Agency's legal authority and promulgated methodology for establishing treatment standards is summarized in EPA's methodology for developing BDAT treatment standards (Reference 1).

This background document presents the sources of treatment performance data used for evaluation of BDAT (Section 2.0), the criteria used in screening data from these sources (Section 3.1), and the criteria used by the BDAT program (BDAT Methodology) for screening data for use in determining

cont'd to pg 1-2

con't from pg 1-1

BDAT (Section 3.2). Section 4.0 of this document presents wastewater treatment performance data available for each BDAT List constituent, a discussion of which data were used as BDAT, and presents the calculation of BDAT treatment standards.

The table following this section presents BDAT treatment standards for each BDAT List constituent in a wastewater matrix. The treatment standards reflect the total concentration of each constituent. The units used for total concentration are μg/l (parts per billion on a weight-by-volume basis) for wastewater.

TABLE 1-1
BDAT TREATMENT STANDARDS FOR WASTEWATERS

BDAT LIST CONSTITUENT	WASTEWATER BDAT TREATMENT STANDARD (UG/L)
Acetone	162
Acetonitrile	97
Acrolein	162
Acrylonitrile	242
Benzene	136
Bromodichloromethane	198
Bromomethane	65
n-Butyl alcohol	137
Carbon tetrachloride	32
Carbon disulfide	179
Chlorobenzene	32
2-Chloro-1,3-butadiene	32
Chlorodibromomethane	32
Chloroethane	268
2-Chloroethyl vinyl ether	35
Chloroform	46
Chloromethane	190
3-Chloropropylene	21
1,2-Dibromo-3-chloropropane	65
1,2-Dibromoethane	16
Dibromomethane	65
Trans-1,4-Dichloro-2-butene	21
Dichlorodifluoromethane	130
1,1-Dichloroethane	59
1,2-Dichloroethane	211
1,1-Dichloroethylene	25
Trans-1,2-Dichloroethylene	54
1,2-Dichloropropane	482
Trans-1,3-Dichloropropylene	21
cis-1,3-Dichloropropylene	21
1,4-Dioxane	28000
Ethyl acetate	195
Ethyl benzene	32
Ethyl cyanide	23000
Ethyl ether	67
Ethyl methacrylate	32
Ethylene oxide	127400
Iodomethane	162
isobutyl alcohol	125
Methanol	33
Methyl ethyl ketone	16
Methyl isobutyl ketone	32
Methyl methacrylate	32
Methacrylonitrile	28000
Methylene chloride	89
Pyridine	8
1,1,1,2-Tetrachloroethane	32
1,1,2,2-Tetrachloroethane	32
Tetrachloroethylene	56

TABLE 1-1
BDAT TREATMENT STANDARDS FOR WASTEWATERS

BDAT LIST CONSTITUENT	WASTEWATER BDAT TREATMENT STANDARD (UG/L)
Toluene	80
Tribromomethane	357
1,1,1-Trichloroethane	54
1,1,2-Trichloroethane	54
Trichloroethylene	54
Trichloromonofluoromethane	23
1,2,3-Trichloropropene	482
1,1,2-Trichloro-1,2,2-trifluoroethane	6496
Vinyl chloride	268
1,2-Xylene	182
1,3-Xylene	182
1,4-Xylene	182
Acenaphthalene	59
Acenaphthene	59
Acetophenone	41198
2-Acetylaminofluorene	40
4-Aminobiphenyl	95
Aniline	807
Anthracene	59
Aramite	20
Benz(a)anthracene	59
Benzal chloride	40
Benzenethiol	219
Benzo(a)pyrene	61
Benzo(b)fluoranthene	40
Benzo(ghi)perylene	4
Benzo(k)fluoranthene	59
p-Benzoquinone	20
Bis(2-chloroethoxy)methane	8
Bis(2-chloroethyl)ether	24
Bis(2-chloroisopropyl)ether	40
Bis(2-ethylhexyl)phthalate	279
4-Bromophenyl phenyl ether	40
Butyl benzyl phthalate	12
2-sec-Butyl-4,6-dinitrophenol	1436
p-Chloroaniline	43736
Chlorobenzilate	72
p-Chloro-m-cresol	53
2-Chloronaphthalene	40
2-Chlorophenol	51
Chrysene	59
ortho-Cresol	189
para-Cresol	1315
Cyclohexanone	20
Dibenz(a,h)anthracene	40
Dibenzo(a,e)pyrene	41
m-Dichlorobenzene	14
o-Dichlorobenzene	64

TABLE 1-1
BDAT TREATMENT STANDARDS FOR WASTEWATERS

BDAT LIST CONSTITUENT	WASTEWATER BDAT TREATMENT STANDARD (UG/L)
p-Dichlorobenzene	88
3,3'-Dichlorobenzidine	95
2,4-Dichlorophenol	76
2,6-Dichlorophenol	78
Diethyl phthalate	203
3,3'-Dimethoxybenzidine	95
p-Dimethylaminoazobenzene	95
3,3'-Dimethylbenzidine	95
2,4-Dimethylphenol	36
Dimethyl phthlate	47
Di-n-butyl phthalate	57
1,4-Dinitrobenzene	231
4,6-Dinitro-o-cresol	277
2,4-Dinitrophenol	123
2,4-Dinitrotoluene	235
2,6-Dinitrotoluene	398
Di-n-octyl phthalate	12
Di-n-propylnitrosamine	400
Diphenylamine	378
Diphenylnitrosamine	290
1,2-Diphenylhydrazine	63
Fluoranthene	68
Fluorene	59
Hexachlorobenzene	40
Hexachlorobutadiene	40
Hexachlorocyclopentadiene	41
Hexachloroethane	40
Hexachlorophene	1.11
Hexachloropropylene	25
Indeno(1,2,3-cd)pyrene	4
Isosafrole	9542
Methapyrilene	9542
3-Methycholanthrene	4
4,4'-Methylenebis (2-chloraniline)	358
Methyl methanesulfonate	219
Naphthalene	59
1,4-Naphthoquinone	20
1-Naphthylamine	378
2-Naphthylamine	378
p-Nitroaniline	20
Nitrobenzene	68
4-Nitrophenol	124
N-Nitrosodi-n-butylamine	290
N-Nitrosodimethylamine	290
N-Nitrosomethylethylamine	290
N-Nitrosomorpholine	290
N-Nitrosopiperidine	10
n-Nitrosopyrrolidine	10

TABLE 1-1
BDAT TREATMENT STANDARDS FOR WASTEWATERS

BDAT LIST CONSTITUENT	WASTEWATER BDAT TREATMENT STANDARD (UG/L)
5-Nitro-o-toluidine	230
Pentachlorobenzene	40
Pentachloroethane	40
Pentachloronitrobenzene	40
Pentachlorophenol	82
Phenacetin	9542
Phenanthrene	59
Phenol	26
Phthalic anhydride	20
Pronamide	93
Pyrene	67
Resorcinol	42
Safrole	9542
1,2,4,5-Tetrachlorobenzene	40
2,3,4,6-Tetrachlorophenol	51
1,2,4-Trichlorobenzene	48
2,4,5-Trichlorophenol	8
2,4,6-Trichlorophenol	8
Tris(2,3-dibromopropyl) phosphate	80
Acrylamide	1042
Antimony	1930
Arsenic	1390
Barium	1150
Beryllium	820
Cadmium	200
Chromium(total)	370
Copper	1280
Lead	280
Mercury	150
Nickel	550
Selenium	820
Silver	290
Thallium	1400
Vanadium	42
Zinc	1020
Cyanide	1200
Fluoride	35000
Sulfide	14000
Aldrin	21
alpha-BHC	0.14
beta-BHC	0.14
delta-BHC	23
gamma-BHC	1.68
Chlordane	3.27
DDD	23
DDE	31
DDT	3.92
Dieldrin	17

TABLE 1-1
BDAT TREATMENT STANDARDS FOR WASTEWATERS

BDAT LIST CONSTITUENT	WASTEWATER BDAT TREATMENT STANDARD (UG/L)
Endosulfan I	23
Endosulfan II	29
Endrin	2.79
Endrin aldehyde	25
Heptachlor	1.16
Heptachlor epoxide	16
Isodrin	21
Kepone	9.5
Methoxyclor	252
Toxaphene	9.5
2,4-Dichlorophenoxyacetic acid	721
Silvex	721
2,4,5-T	721
Disulfoton	770
Famphur	336
Methyl parathion	336
Parathion	336
Phorate	770
Aroclor 1016	13
Aroclor 1221	14
Aroclor 1232	13
Aroclor 1242	17
Aroclor 1248	13
Aroclor 1254	14
Aroclor 1260	14
Hexachlorodibenzo-p-dioxins	0.031
Hexachlorodibenzofurans	0.035
Pentachlorodibenzo-p-dioxins	0.018
Pentachlorodibenzofurans	0.023
Tetrachlorodibenzo-p-dioxins	0.0062
Tetrachlorodibenzofurans	0.0066
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.0062

2.0 SOURCES OF TREATMENT DATA

This section describes the method of gathering wastewater treatment performance data and describes each of the sources used in this document.

2.1 Methodology of Gathering Data

Wastewater treatment performance data were gathered from existing databases and other sources available to the Agency. Existing databases include the BDAT database, the ITD database, the data summarized in the NPDES database, and the WERL database. In addition, wastewater treatment performance data were also available from EPA's wet air oxidation (WAO) treatment test and literature articles discussing technologies such as WAO and PACT. Each database was reviewed for wastewater treatment performance data for BDAT List constituents. The treatment performance data available from these databases as well as additional testing and literature data are summarized in the tables of Section 4.0.

2.2 Description of Treatment Data Sources

2.2.1 BDAT Database

Concurrent with the RCRA/HSWA land disposal prohibitions, HSWA directed EPA to develop treatment standards for all listed hazardous wastes. The resulting effect of these treatment standards will be to substantially reduce the toxicity of the waste or the likelihood of migration of hazardous constituents from the wastes. Wastes that meet these treatment standards are not subject to the land disposal prohibitions.

For the BDAT program, the list of hazardous wastes was divided into thirds. The amendments of RCRA/HSWA restrict the land disposal of these various classes (or lists) of hazardous wastes by certain dates. The BDAT database consists of treatment performance data used or collected as part of these BDAT first, second, and third third programs and used to set treatment performance standards.

Extensive sampling of incineration systems was conducted under the BDAT program. As part of these sampling episodes incineration scrubber water data were collected to set BDAT standards for wastewaters of specific waste codes. In referring specifically to wastewaters (i.e., leachates) the Agency does not consider incineration scrubber water data as representing the performance of a specific wastewater treatment technology, since you would not normally incinerate a wastewater. Therefore, only treatment performance data that represented a specific treatment technology amenable to wastewaters such as biological treatment, chemical precipitation, etc. were used from the BDAT database.

BDAT wastewater treatment performance data were available from waste codes K103, K104, and K062 from the BDAT first and second third promulgated rules. The wastewater treatment technologies represented by these codes include liquid/liquid extraction, steam stripping, and activated carbon for organics and chromium reduction followed by chemical precipitation, sedimentation, and filtration for metals.

Additionally, as part of the first third solvents rule specifying BDAT treatment standards for waste codes F001-F005, the Agency examined data from the organic chemicals, plastics, and synthetic fibers (OCPSF) database for organic constituents. The technologies examined for these codes included biological treatment, activated carbon, steam stripping, air stripping, and wet air oxidation. The wastewater treatment performance data presented for F001-F005 constituents were also incorporated into the treatment performance database under BDAT.

As part of BDAT third third, a wastewater treatment test was conducted on the wet air oxidation technology for specific third third U and P waste codes. The treatment performance data presently available from this test were incorporated into the wastewater treatment performance database under WAO.

2.2.2 ITD Database--Promulgated Limits

In response to the Federal Water Pollution Control Act (FWPCA) of 1972 and the Clean Water Act (CWA) of 1977, the EPA was charged with developing and promulgating regulations to reduce the level of pollutants in wastewater discharged from industrial point sources using the "Best Available Technology (BAT) economically achievable." The program of developing and promulgating effluent guidelines was assigned to the Industrial Technology Division (ITD) within EPA's Office of Water Regulations and Standards. To date ITD has promulgated effluent regulations for 27 industrial categories.

The treatment performance data used for ITD promulgation efforts was summarized by category in specific effluent limitations guidelines and standards development documents. The treatment performance data for BDAT List organic constituents for which ITD limits exist was incorporated into the wastewater treatment database from the Final Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics, and Synthetic Fibers Point Source Category. Available treatment performance data for BDAT List inorganic and metal constituents for which ITD limits exist, were also incorporated into the wastewater treatment database. Wastewater treatment performance data were taken from the final Development Documents for Effluent Limitations Guidelines and Standards for the following Point Source Categories:

- Inorganics
- Nonferrous Metals Manufacturing
- Metal Finishing

2.2.3 NPDES Database

Under the Clean Water Act, the discharge of pollutants into the waters of the United States is prohibited unless a permit is issued by EPA or a state under the National Pollutant Discharge Elimination System (NPDES). An NPDES permit provides effluent limits for specific pollutants that a facility can discharge. The permit also provides for monitoring and reporting requirements by a facility to check whether the effluent limitations are being met. The monitoring data submitted by facilities as part of the NPDES permit program is summarized in a database.

The NPDES database was searched for 90 BDAT List constituents to identify facilities which have monitoring data for any of those constituents. Constituent data from this search which represents wastewater effluent concentrations has been incorporated into the wastewater treatment performance database. Treatment technologies or treatment trains were identified in some, but not all cases, therefore, the NPDES data is to date incomplete and will be supplemented as time allows.

2.2.4 WERL Database

U.S. EPA's Risk Reduction Engineering Laboratory, which now includes the former Water Engineering Research Laboratory (WERL), has developed and is continuing to expand a database on the treatability of chemicals in various types of waters and wastewaters. This WERL database has been compiled from wastewater treatment performance data available through the literature. The treatment performance data available through this database for BDAT List constituents has been included in the wastewater treatment performance database and is summarized in the tables of Section 4.0.

2.2.5 Other Sources

Other sources of wastewater treatment performance data for BDAT List constituents include any articles identified which were not already part of the WERL database. Literature data submitted by industry on the WAO and PACT treatment processes were also available for inclusion in the wastewater treatment performance database.

3.0 METHODOLOGY USED TO SCREEN DATA

This section describes the criteria used in screening out useful wastewater treatment performance data from the various sources and the methodology used by the BDAT program in determining BDAT.

3.1 Data Screening Criteria

All of the data available from the various sources were screened to identify (1) wastewater treatment performance data, and (2) data representing a BDAT List constituent.

As discussed in Section 2.2.1, BDAT incineration scrubber water data was not considered wastewater treatment performance data. In addition, treatment performance data for constituents whose BDAT standards were based on a transfer of treatment performance data from a similar compound were also eliminated from consideration.

The NPDES database represents effluent monitoring data for several types of waters and wastewaters. Those data which represented stormwater runoff, uncontaminated rainwater, and noncontact cooling water were not considered wastewaters and were therefore not included in the wastewater treatment performance database.

Other sources of data (i.e., literature articles) were screened to identify wastewater treatment data based on a treatment performance test. As with the other sources, the literature articles were screened for data on BDAT List constituents only.

3.2 BDAT Methodology

EPA's promulgated methodology for establishing BDAT treatment standards is discussed in EPA's Methodology for Developing BDAT Treatment Standards (Reference 1). This methodology consists of the following steps:

1. Identify waste treatability groups;
2. Determine applicable technologies for treatment of the waste treatability groups;
3. Determine demonstrated technologies for treatment of the waste treatability groups;
4. Collect and evaluate treatment performance data;
5. Based on the evaluation, determine the best demonstrated technology for the waste treatability group;
6. Verify that the best demonstrated technology is also available;
7. Select hazardous constituents for regulation, and
8. Calculate BDAT treatment standards.

Since the purpose of this document is to identify the Best Demonstrated Available Technology wastewater treatment standard for each BDAT List constituent, steps 1 and 7, identification of waste treatability groups and selection of hazardous constituents for regulation, do not apply.

In step 2, to be applicable, a technology must theoretically be usable to treat the constituent in question in the waste matrix in question.

For example, chemical precipitation is an applicable technology for metal constituents in a wastewater matrix. All of the treatment technologies presented in Section 4.0 represent applicable treatment technologies for organic or inorganic constituents in a wastewater.

In step 3, to be demonstrated, a technology must be employed in full-scale operation for treatment of the waste in question or a similar waste. Technologies available only at pilot- and bench-scale operations are not considered in identifying demonstrated technologies. The wastewater technologies identified in the treatment performance tables of Section 4.0 all represent treatment technologies which are demonstrated at full-scale facilities for organic and/or inorganic constituents.

For steps 4 and 5, previous sections of this document have discussed the collection of wastewater treatment performance data for each of the BDAT List constituents. The treatment performance data summarized in Section 4.0 was then evaluated to determine which data set represented the "best" treatment performance data for that BDAT List constituent. A discussion of the evaluation is given with each constituent in Section 4.0.

In step 6, to verify that a best demonstrated technology is also "available," the treatment technology must (1) be commercially available, and (2) provide "substantial" treatment of the constituent of concern in the waste matrix of concern. All of the demonstrated treatment technologies identified in Section 4.0 tables are also commercially available. "Substantial" treatment by a technology was evaluated on a case-by-case basis.

Step 8, calculation of BDAT treatment standards, involves three substeps. These are: (1) accuracy correction of the treatment performance data to take into account any analytical interferences associated with the chemical make up of the samples, (2) determination of a variability factor specific to each constituent in a treatment performance data set to correct for normal variations in the performance of a particular technology over time. The variability factor is designed to reflect the 99th percentile level of performance the technology achieves in commercial operation. And (3) calculation of the BDAT treatment standard which is equal to the average of the accuracy corrected data times the variability factor. Calculation of BDAT treatment standards for each BDAT List constituent and a discussion of what accuracy correction and variability factors were used, are presented in Section 4.0.

4.0 TREATMENT PERFORMANCE DATA AND CALCULATION OF BDAT TREATMENT STANDARDS

This section presents the wastewater treatment performance data available for each BDAT List constituent. The sources of this data were presented and discussed in Section 2.0. For each BDAT List constituent a discussion follows which describes the analysis for that constituent. Justification of the technology and treatment performance data used as BDAT is given. The resulting BDAT treatment standard calculated for each constituent is presented in Table 4-173 at the end of this section.

The treatment performance data presented in the tables of this section were analyzed to determine BDAT for each constituent. The methodology and database hierarchy used in the analysis follows:

(1) For those volatile, semivolatile, and metal constituents with ITD performance data and a promulgated ITD treatment standard, the ITD data were used as BDAT. The treatment standard representing ITD Option 1 was used in all cases.

(2) Data from a BDAT treatment test were used as BDAT for those constituents where it was available and did not already have BDAT set on an ITD limit.

(3) For those constituents without ITD data or BDAT treatment test data, the treatment performance data were evaluated by technology, technology size, influent concentration and average effluent concentration. Full scale treatment data with an influent concentration range greater than 100 ppb were preferred over pilot or bench scale data and preferred over data with a low (i.e., 0-100 ppb) influent concentration range.

Treatment performance data representing various full scale technologies with high influent concentrations were compared by examination of their average effluent values and percent removals.

This section has been divided into subsections by constituent groups (i.e., volatiles, semivolatiles, etc.).

KEY TO TREATMENT TECHNOLOGIES

AAS — Activated Alumina Sorption
AC — Activated Carbon
AFF — Aerobic Fixed Film
AL — Aerobic Lagoons
API — API Oil/Water Seperator
AS — Activated Sludge
AirS — Air Stripping
AnFF — Anaerobic Fixed Film
AnL — Anaerobic Lagoons
BGAC — Biological Granular Activated Carbon
CAC — Chemically Assisted Clarification
Chem/Cond — Chemical Conditioning
ChOx — Chemical Oxidation (Parantheses shows oxidation chemical ie. ChOx (Oz) - is ozone)
ChOx/Pt — Chemical Oxidation/Precipitation
ChPt — Chemical Precipitation
Chred — Chemical Reduction
Chred/Pt — Chemical Reduction/Precipitation
CN/Ox — Cyanide Oxidation
COAG — Coagulation
DAF — Dissolved Air Flotation
Fil — Filtration
FLOAT — Floatation
GAC — Activated Carbon (Granular)
Gr/Rem — Grease/Oil Removal
KPEG — Dechlorination of Toxics using an Alkoxide (Formed by the reaction of potassium hydroxide with polyethylene glycol (PEG400))
IE — Ion Exchange
In-PB — In-Plant Biological Treatment
L — Lime
LL — Liquid, Liquid Extraction
Neut — Neutralization
PACT — Powdered Activated Carbon Addition to Activated Sludge
RBC — Rotating Biological Contactor
RO — Reverse Osmosis
SBR — Sequential Batch Reactor
SCOx — Super Critical Oxidation
SExt — Solvent Extraction
SS — Steam Stripping
Sed — Sedimentation
TF — Trickling Filter
UF — Ultrafiltration
UV — Ultraviolet Radiation
WOx — Wet Air Oxidation

NOTES:

_____ + _____ is the first process unit followed in process train by the second ie. AS + Fil - Activated Sludge followed by Filtration.
_____ w _____ is the two units together ie. UFwPAC - Ultrafiltration using Powdered Activated Carbon.
_____ (B) is batch instead of continuous flow.

4.1 Volatiles

Acetone. The data available for the volatile constituent acetone were compiled from the WERL and NPDES databases and wet air oxidation (WAO) data. Demonstrated treatment technologies included activated sludge (AS), granular activated carbon (GAC), powdered activated carbon addition to activated sludge (PACT), reverse osmosis (RO), steam stripping (SS), and wet air oxidation (WOx). The technology size included full, pilot and bench-scale studies. The resulting effluent concentrations ranged from 0.846 ppb to 10,000 ppb.

The BDAT standard was set using GAC technology and an achievable effluent of 50 ppb. GAC was selected based on its technology size (full-scale), influent concentration (1,000-10,000 ppb) and the effluent achieved (95% removal). Other data were presented at the full-scale size but had lower removal rates or were for a technology with a less proven track record in comparison to GAC.

The resulting BDAT treatment standard for acetone is 162 ppb as shown in Table 4-173.

TABLE 4-1
WASTEWATER TREATMENT PERFORMANE DATA
FOR ACETONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0084859			8	126.000			NPDES
		NH0001376			10	620.560			NPDES
		MA0000442			10	808.000			NPDES
		NY0107760			14	296.429			NPDES
		CT0001341			23	420.000			NPDES
		AZ0000108			11	0.846			NPDES
		AZ0000106			11	1.000			NPDES
		AZ0000108			11	1.000			NPDES
		MA0000442			4	31.000			NPDES
		NY0081696			8	804.965			NPDES
		NY0107484			16	1010.780			NPDES
AS	Pilot	241B		1000-10000	5	28.000		98.5	WERL
AS	Full	1168E		10000-100000		1100.000		97.1	WERL
GAC	Full	2458		1000-10000	1	50.000		95.9	WERL
PACT	Bench	242E		100-1000		20.000		91.4	WERL
PACT	Bench	Zimpro		233	1	20.000		91	WAO
RO	Full	2508		1000-10000		200.000		81	WERL
RO	Full	250B		10000-100000		5800.000		78	WERL
SS	Pilot	1082E		10000-100000		10000.000		80	WERL
WOx	Full	242E		>1000000		230.000		99.99	WERL
WOx (B)	Bench	780		>1000000		10000.000		99.4	WERL

Acetonitrile. The data available for the volatile constituent acetonitrite were compiled from the WERL database and WAO data. Demonstrated treatment technologies included AS, GAC, PACT, SS, and WOx. The technology size included bench, pilot, and full-scale data. The resulting effluent concentrations ranged from 5.0 ppb to 30,000 ppb.

The BDAT standard was set using the PACT technology and an achievable effluent of 30 ppb. PACT was selected based on its effluent concentration and chosen as BDAT over GAC due to its higher influent concentration. The resulting BDAT treatment standard for acetonitrile is 97 ppb as shown in Table 4-173.

Acrolein. The data available for the volatile constituent acrolein were compiled from the WERL and NPDES databases and WAO data. Demonstrated treatment technologies included AS, biological treatment (BT), coagulation followed by sedimentation (COAG+Sed), and WOx. The technology size both full and bench-scale data. Resulting effluent concentrations ranged from 0.002 ppb to 21,696 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 50 ppb. AS was selected based on its treatment performance, as an acceptable wastewater treatment technology and the preference of WERL data over NPDES data for which little is known. The resulting BDAT treatment standard for acrolein is 162 ppb as shown in Table 4-173.

TABLE 4-2
WASTEWATER TREATMENT PERFORMANE DATA
FOR ACETONITRILE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	1054E		10000-100000		5100.000		83	WERL
GAC	Bench	1054E		1000-10000		5.000		99.90	WERL
PACT	Bench	Zimpro		30000	1	30.000		99.9	WAO
SB	Pilot	1082E		100000-1000000		2000.000		99.48	WERL
WOx	Bench	Zimpro		1040000	1	17000.000		98.4	WAO
WOx	Full	242E		10000-100000		30000.000		83	WERL
WOx (B)	Bench	1054E		100000-1000000		28000.000		96.9	WERL
WOx (B)	Bench	1054E		10000-100000		30000.000		54	WERL

TABLE 4-3
WASTEWATER TREATMENT PERFORMANE DATA
FOR ACROLEIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	100.000			NPDES
		LA0066214			15	50.357			NPDES
		PA0011371			19	1.000			NPDES
		SC0002798			14	27.143			NPDES
		NJ0001660			5	81.000			NPDES
		TN0002810			4	33.000			NPDES
		IL0000621			1	10.000			NPDES
		VA0002160			12	100.000			NPDES
		MI0002313			2	0.002			NPDES
		LA0066435			11	100.000			NPDES
		NJ0028291			2	1.000			NPDES
		SC0000281			12	21696.000			NPDES
		IL0000621			2	8.000			NPDES
		PA0026379			2	60.000			NPDES
		TX0006786			7	50.000			NPDES
		NJ0004286			4	22.500			NPDES
AS	Bench	2020		10000-100000		50.000		99.92	WERL
BT	Full	PA0026549			20	4016.000			NPDES
BT	Full	IL0001350			24	50.000			NPDES
BT	Full	LA0036245			36	95.000			NPDES
COAG+Sed	Full	PA0013129			1	10.000			NPDES
WOx	Bench	Zimpro		8410000	1	3000.000		99.96	WAO

Acrylonitrile. For the volatile constituent acrylonitrile, several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases as well as WAO data. Demonstrated treatment technologies included in-plant biological treatment (In-PB), AS, activated sludge followed by filtration (AS+Fil), GAC, and WOx, with technology sizes including bench and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for acrylonitrile is BT and using the ITD median long-term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for acrylonitrile is 242 ppb.

TABLE 4-4
WASTEWATER TREATMENT PERFORMANE DATA
FOR ACRYLONITRILE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	202D		100000-1000000		50.000		99.97	WERL
AS	Full	6B		1000-10000	2	50.000		98.6	WERL
AS	Bench	923D		>1000000	3	500.000		99.95	WERL
AS	Bench	923D		100000-1000000	3	500.000		99.93	WERL
AS	Bench	1054E		1000-10000		1200.000		88	WERL
AS	Full	6B		10000-100000	33	50.000		99.93	WERL
AS+Fil	Full	6B		100000-1000000	15	50.000		99.97	WERL
GAC	Bench	1054E		1000-10000		1.500		99.88	WERL
In-PB	Full	2536	50	43496-414785	15	50.000			ITD-L
WOx	Bench	Zimpro		8060000	1	80000.000		98	WAO
WOx (B)	Bench	236A		>1000000	1	7200.000		99.91	WERL
WOx (B)	Bench	1054E		10000-100000		900.000		99.1	WERL
WOx (B)	Bench	1054E		>1000000		10000.000		99.4	WERL

Benzene. For the volatile constituent benzene, several sources of wastewater treatment performance data were available, including data from the ITD, BDAT, and WERL databases as well as WAO data. Demonstrated treatment technologies included aerobic lagoons (AL), aerobic lagoons followed by activated sludge (AL+AS), API oil/water separation followed by dissolved air flotation and activated sludge (API+DAF+AS), AS, AS+Fil, air stripping (AirS), air stripping followed by granular activated carbon, (AirS+GAC), GAC, liquid, liquid extraction (LL), liquid, liquid extraction followed by steam stripping (LL+SS), liquid, liquid extraction followed by steam stripping and activated carbon (LL+SS+AC), PACT, RO, SS, trickling filter (TF), trickling filter followed by activated sludge (TF+AS), ultrafiltration (UF) and WOx, with technology sizes including bench and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for benzene is SS and using the ITD median long-term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for benzene is 136 ppb.

Bromodichloromethane. The data available for the volatile constituent bromodichloromethane were compiled from the WERL and NPDES databases and WAO data. Demonstrated treatment technologies included AS, AirS, BT, chemical assisted clarification in conjunction with air stripping (CAC+AirS) and WOx. The technology size included full, pilot and bench scale. The resulting effluent concentrations ranged from 0.030 ppb to 2,503.4 ppb.

The BDAT standard was set using the RO technology and an achievable effluent of 61 ppb. RO was selected based on technology size (full-scale), influent concentration range and effluent removal. Other full-scale data were for lower influent values or for data of poorer quality (i.e., letter code E on facility code for WERL database) or from the NPDES database for which only incomplete data were available. Lower effluent concentrations were achieved using PACT but the data represented bench-scale studies. The resulting BDAT treatment standard for bromodichloromethane is 198 ppb as shown in Table 4-173.

TABLE 4-5
WASTEWATER TREATMENT PERFORMANE DATA FOR BENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		1000-10000		60.000		98	WERL
AL	Full	6B		100-1000	2	10.000		98.9	WERL
AL	Full	1B		100-1000	6	10.000		94.4	WERL
AL	Full	8B		100-1000	2	10.000		92.3	WERL
AL+AS	Full	233D		10000-100000	21	13.000		99.9	WERL
API+DAF+AS	Full	1482D		1000-10000	4	3.700		99.98	WERL
AS	Full	6B		100-1000	7	10.000		98.8	WERL
AS	Bench	200B		100-1000	16	0.800		99.3	WERL
AS	Bench	200B		100-1000	8	1.000		99.83	WERL
AS	Full	1B		100-1000	6	2.000		99	WERL
AS	Full	6B		100-1000	22	30.000		91.7	WERL
AS	Full	1B		100-1000	6	1.000		99.55	WERL
AS	Full	8B		100-1000	14	10.000		95.7	WERL
AS	Full	6B		100-1000	3	10.000		95.6	WERL
AS	Full	1B		100-1000	6	2.000		98.9	WERL
AS	Bench	202D		100000-1000000		40.000		99.97	WERL
AS	Full	9B		1000-10000	3	10.000		99.09	WERL
AS	Full	6B		1000-10000	27	11.000		99.8	WERL
AS	Full	6B		1000-10000	3	10.000		99.71	WERL
AS	Full	8B		0-100	28	10.000		89.6	WERL
AS	Bench	200B		0-100	16	0.500		97.8	WERL
AS	Full	6B		10000-100000	15	10.000		99.97	WERL
AS	Full	234A		100-1000		0.800		99.83	WERL
AS	Full	201B		0-100	10	6.000		81	WERL
AS	Full	1B		0-100	6	16.000		84	WERL
AS	Pilot	206B		0-100	20	0.200		99.73	WERL
AS	Full	234A		0-100		0.700		97.4	WERL
AS+Fil	Full	6B		100000-1000000	3	20.000		99.99	WERL
AirS	Bench	1328E		10000-100000	5	9300.000		90	WERL
AirS	Full	322B		100-1000	22	0.440		99.74	WERL
AirS	Pilot	224B		100-1000	1	0.500		99.67	WERL
AirS	Full	322B		1000-10000	19	52.000		98.7	WERL
AirS	Pilot	1362E		100-1000	3	1.000		99.09	WERL
AirS+GAC	Full	229A		0-100	19	1.000		90.9	WERL

TABLE 4-5
WASTEWATER TREATMENT PERFORMANE DATA
FOR BENZENE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
GAC	Full	245B		1000-10000	1	10.000		99.28	WERL
LL	Full	K104	5	4500-320000	5	35600.000	78.0		BDAT
LL	Full	K103	5	32000-61000	5	3560.000	78.0		BDAT
LL+SS	Full	K103/K104	5	4500-320000	5	5.800	78.0		BDAT
LL+SS+AC	Full	K103/K104	5	4500-620000	4	19.000	78.0		BDAT
PACT	Bench	242E		0-100		5.000		83	WERL
PACT	Bench	200B		100-1000	12	0.700		99.34	WERL
PACT	Bench	Zimpro		290	1	1.000		99.7	WAO
PACT	Bench	Zimpro		29	1	5.000		83	WAO
RO	Full	250B		1000-10000		140.000		92.2	WERL
RO	Full	250B		0-100		3.800		95.1	WERL
RO	Pilot	323B		0-100	1	32.000		19	WERL
RO	Pilot	250B		100-1000		50.000		78	WERL
RO	Full	250B		100-1000		67.000		92.7	WERL
SS	Full	0415*	10	22300-48100	4	38.800			ITD-L
SS	Full	2680	10	34693-147212	10	10.000			ITD-L
SS	Full	1484	10	239-2006310	13	44.800			ITD-L
SS	Full	0415**	10	274000-412000	3	200.300			ITD-L
SS	Full	6B		100000-1000000	3	200.000		99.94	WERL
SS	Full	6B		100000-1000000	12	46.000		99.99	WERL
SS	Full	6B		10000-100000	2	10.000		99.97	WERL
SS	Full	6B		10000-100000	10	10.000		99.99	WERL
SS	Full	251B		100-1000	10	10.000		98.3	WERL
TF	Full	1B		0-100	5	1.000		97.5	WERL
TF+AS	Full	6B		10000-100000	3	10.000		99.97	WERL
UF	Pilot	250B		1000-10000		230.000		78	WERL
WOx	Full	242E		1000-10000		29.000		99.64	WERL
WOx (B)	Bench	1054E		1000-10000		500.000		53	WERL
WOx (B)	Bench	1054E		100000-1000000		180000.000		82	WERL

TABLE 4-6
WASTEWATER TREATMENT PERFORMANE DATA
FOR BROMODICHLOROMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		PA0028862			2	3.000			NPDES
		LA0065501			6	8.300			NPDES
		LA0066214			15	11.786			NPDES
		LA0066435			12	4.400			NPDES
		PA0011371			8	1.000			NPDES
		NJ0060968			1	1.800			NPDES
		NY0094781			5	7.900			NPDES
		NJ0004952			24	4.872			NPDES
		PA0026379			3	4.000			NPDES
		LA0005983			67	0.010			NPDES
		PA0027049			12	3.032			NPDES
		NJ0060988			17	7.359			NPDES
		NY0075019			8	1.800			NPDES
		NY0074489			7	1.300			NPDES
		NY0108154			10	1.100			NPDES
		NY0165166			3	1.000			NPDES
		NY0007048			9	1.000			NPDES
		KY0003603			1	5.000			NPDES
		NY0007579			1	4.000			NPDES
		NY0165166			1	1.000			NPDES
		NY0107697			3	8.300			NPDES
		NY0007579			6	3.500			NPDES
		NY0007579			4	2.300			NPDES
		NY0007889			8	2503.400			NPDES
		NY0024392			5	2.160			NPDES
		NY0027057			28	15.000			NPDES
AS	Full	18		0–100	2	6.000		71	WERL
AS	Pilot	2068		0–100	20	0.200		99.78	WERL
AirS	Pilot	225B		0–100	1	0.130		61	WERL
AirS	Pilot	213B		0–100	1	1.000		93.8	WERL
AirS	Bench	1326E		100–1000	5	37.000		82	WERL
AirS	Pilot	210B		0–100	1	1.000		96.2	WERL
BT	Full	PA0026786			7	266.000			NPDES
BT	Full	PA0008419			1	8.000			NPDES
BT	Full	PA0026247			21	4.000			NPDES
BT	Full	PA0008419			10	122.667			NPDES
BT	Full	PA0026603			30	4.000			NPDES
BT	Full	NY0079481			9	6.411			NPDES
BT	Full	LA0038245			38	5.190			NPDES
CAC+AirS	Full	16330		0–100	19	0.030		90	WERL
ChOx	Bench	640E		0–100	2	3.000		89	WERL
ChOx	Bench	640E		0–100	1	1.000		95	WERL
PACT	Bench	242E		100–1000		20.000		96	WERL
PACT	Bench	Zimpro		500	1	20.000		98	WAO
RO	Pilot	180A		0–100		0.110		79	WERL
RO	Full	250B		100–1000		61.000		91	WERL
WOx	Full	242E		>1000000		500.000		99.95	WERL

Bromomethane. The data for the volatile constituent bromomethane were compiled from the WERL and NPDES databases. The demonstrated technologies were AS and BT. The data were for full-scale technologies resulting in an effluent concentration range of 1 ppb to 20 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 20 ppb. AS was selected as BDAT since the WERL data is preferred over incomplete NPDES data.

The resulting BDAT treatment standard for bromomethane is 65 ppb as shown in Table 4-173.

n-Butyl Alcohol. The data available for the volatile constituent n-butyl alcohol were compiled from the WERL database. Demonstrated technology consisted of full-scale AS study with a resulting effluent concentration of 40 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 40 ppb. AS was selected being the only technology reported for n-butyl alcohol.

The resulting BDAT treatment standard for n-butyl alcohol is 137 ppb as shown in Table 4-173.

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TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR BROMOMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0068435			12	5,800			NPDES
		LA0068214			15	11,786			NPDES
		PA0011371			9	1,000			NPDES
		LA0065501			6	10,000			NPDES
		NJ0028291			2	1,000			NPDES
AS	Full	18		100-1000	5	20,000		82	WERL
AS	Full	18		100-1000	2	20,000		82	WERL
BT	Full	LA0038245			38	9,888			NPDES

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TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR n-BUTYL ALCOHOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1168E		10000-100000		40,000		99.79	WERL

Carbon Tetrachloride. The data available for the volatile constituent carbon tetrachloride were compiled from the WERL database, BDAT database, and WAO data. Demonstrated treatment technologies included AL, AS, AS+Fil, AirS, BT, chemically assisted clarification (CAC), GAC, PACT, RO, SS, and WOx. The technology size included full, pilot and bench-scale data. The resulting effluent concentrations ranged from 0.200 ppb to 12,000 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 10 ppb. BT was selected based on the full-scale data developed for BDAT using BDAT guidelines. This is supported by the full-scale AS and AL data from the WERL database.

The resulting BDAT treatment standard for carbon tetrachloride is 32 ppb as shown in Table 4-173.

TABLE 4-9
WASTEWATER TREATMENT PERFORMANE DATA FOR CARBON TETRACHLORIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		0-100	14	11,000		84	WERL
AL	Pilot	203A		0-100	14	15,000		78	WERL
AS	Pilot	203A		0-100	14	13,000		81	WERL
AS	Full	1B		100-1000	6	16,000		88	WERL
AS	Pilot	206B		0-100	20	0,200		99.67	WERL
AS	Full	975B		0-100		3,000		94.8	WERL
AS	Bench	202D		10000-100000		130,000		99.32	WERL
AS	Full	6B		100-1000	3	10,000		98.7	WERL
AS	Pilot	241B		100-1000	5	5,000		98.3	WERL
AS	Pilot	240A		0-100	12	4,000		90.7	WERL
AS+Fil	Full	6B		1000-10000	14	10,000		99.09	WERL
AS+Fil	Full	6B		10000-100000	2	10,000		99.98	WERL
AirS	Bench	1328E		10000-100000	5	7600,000		89	WERL
BT	Full	P225		51-44000	17	10,000			BDAT
BT	Full	REF4		95	1	5,500			BDAT
CAC	Pilot	203A		100-1000	14	101,000		0	WERL
GAC	Full	1264B		0-100		1,000		87	WERL
GAC	Full	237A		0-100	1	10,000		89	WERL
PACT	Bench	242E		1000-10000		30,000		98.5	WERL
PACT	Bench	Zimpro		860	1	1,000		99.9	WAO
PACT	Bench	Zimpro		2000	1	30,000		98.5	WAO
RO	Pilot	323B		100-1000	1	2,000		98	WERL
SCOx	Pilot	65D		100-1000		20,000		96.5	WERL
SS	Full	251B		10000-100000	10	5,000		99.99	WERL
SS	Full	251B		1000-10000	10	10,000		99.41	WERL
TF	Pilot	203A		0-100	14	28,000		62	WERL
TF	Pilot	240A		0-100	12	4,000		90.7	WERL
WOx	Bench	Zimpro		4330000	1	12000,000		99.7	WAO
WOx	Full	242E		>1000000		2000,000		99.92	WERL

Carbon Disulfide. The only data available for the volatile constituent carbon disulfide were incomplete NPDES data from one facility. Due to the lack of any other information for this compound the BDAT treatment standard was based on the average effluent concentration from this facility. The resulting BDAT treatment standard for carbon disulfide is 179 ppb as shown in Table 4-173.

Chlorobenzene. The data available for the volatile constituent chlorobenzene were compiled from the WERL database, BDAT database, and WAO data. Demonstrated treatment technologies included aerobic fixed film (AFF), AL, AS, AirS, biological granular activated carbon columns (BGAC), BT, GAC, PACT, RO, SS, and WOx. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 0.250 ppb to 1,550,000 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 10 ppb. BT was selected based on the full-scale data developed for BDAT using BDAT guidelines. This is supported by the full-scale AS and PACT data. The resulting BDAT treatment standard for chlorobenzene is 32 ppb as shown in Table 4-173.

TABLE 4-10
WASTEWATER TREATMENT PERFORMANE DATA
FOR CARBON DISULFIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0000345			2	55.000			NPDES

TABLE 4-11
WASTEWATER TREATMENT PERFORMANE DATA
FOR CHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0–100	9	1.000		90.7	WERL
AL	Bench	371D		1000–10000		160.000		94.7	WERL
AS	Bench	200B		100–1000	12	1.100		99.17	WERL
AS	Bench	200B		100–1000	6	1.300		99.81	WERL
AS	Full	975B		100–1000		6.000		94.6	WERL
AS	Full	6B		100–1000	4	10.000		98.9	WERL
AS	Bench	200B		0–100	8	0.200		99.23	WERL
AS	Full	975B		100–1000		10.000		94.6	WERL
AS	Full	975B		0–100		6.000		84	WERL
AS	Full	1B		100–1000	8	3.000		98.9	WERL
AS	Pilot	208B		100–1000	20	1.300		99.34	WERL
AS	Pilot	241B		100–1000	5	4.000		98.6	WERL
AS	Full	975B		100–1000		12.000		97.8	WERL
AirS	Bench	1328E		1000–10000	5	1600.000		77	WERL
AirS	Bench	1328E		10000–100000	5	3300.000		89	WERL
BGAC	Bench	501A		0–100	23	0.290		97.8	WERL
BT	Full	P206		928–49775	8	841.000			BDAT
BT	Full	P248		10–8040	13	101.000			BDAT
BT	Full	P263		443–832	3	504.000			BDAT
BT	Full	REF4		1900	1	12.000			BDAT
BT	Full	P202		79–429	20	10.000			BDAT
BT+AC	Full	P248		10–7200	16	30.000			BDAT
GAC	Full	245B		100–1000	1	10.000		98.6	WERL
GAC	Full	245B		1000–10000	1	10.000		99.7	WERL
GAC	Full	237A		1000–10000	1	10.000		99.17	WERL
GAC	Full	1421D		0–100		0.250		58	WERL
PACT	Full	6B		1000–10000	4	10.000		99.38	WERL
PACT	Bench	200B		100–1000	11	0.800		99.37	WERL
PACT	Bench	242E		0–100		5.000		84	WERL
PACT	Bench	Zimpro		31	1	5.000		84	WAO
RO	Pilot	323B		0–100	1	12.000		50	WERL
RO	Full	250B		0–100		4.000		53	WERL
RO	Full	250B		1000–10000		120.000		91.6	WERL
SS	Full	251B		100–1000	10	10.000		97.4	WERL
WOx	Bench	Zimpro		5535000	1	1550000.000		72	WAO
WOx	Bench	Zimpro		792000	1	61000.000		92.3	WAO

2-Chloro-1,3-butadiene. For the volatile constituent 2-chloro-1,3-butadiene no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data from was hexachlorobutadiene, Third Third Group III A2c(3)(e). Using a transfer from this constituent results in a BDAT of AS+Fil for 2-chloro-1,3-butadiene and a calculated BDAT treatment standard of 32 ppb as shown in Table 4-173.

Chlorodibromomethane. The data available for the volatile constituent chlorodibromomethane were compiled from the WERL and NPDES databases. Demonstrated treatment technologies included AS, AirS, BT, CAC+AirS, GAC, and RO. The technology size included full, pilot, and bench-scale data. The resulting effluent concentrations ranged from 0.010 ppb to 2503.370 ppb.

The BDAT standard was set using GAC technology and an achievable effluent of 10 ppb. GAC was selected based on the technology size being full-scale. CAC+AirS data were also presented for full-scale, but consists of two technologies and the data as presented can not isolate the removals associated with each individual process. In addition, WERL data was preferred over incomplete NPDES data.

The resulting BDAT treatment standard for chlorodibromomethane is 32 ppb as shown in Table 4-173.

Chloroethane. For the volatile constituent chloroethane, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, PACT, and SS, with a technology size of full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for chloroethane is SS and using the ITD median long term average and ITD Option 1 variability factors, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for chloroethane is 268 ppb.

TABLE 4-12
WASTEWATER TREATMENT PERFORMANE DATA FOR CHLORODIBROMOMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NJ0026291			2	1.000			NPDES
		NY0007889			8	2503.370			NPDES
		AZ0000016			11	11.000			NPDES
		KY0003603			1	5.000			NPDES
		PA0011371			8	1.000			NPDES
		PA0026379			3	2.300			NPDES
		PA0026662			2	2.000			NPDES
		PA0027049			13	21.838			NPDES
		LA0005983			66	0.010			NPDES
		AZ0000108			11	1.000			NPDES
		AZ0000108			11	1.491			NPDES
AS	Pilot	2068		0-100	20	7.000		88	WERL
AirS	Pilot	2138		0-100	1	1.000		80	WERL
AirS	Bench	1328E		100-1000	5	50.000		78	WERL
BT	Full	PA0008419			14	96.000			NPDES
CAC+AirS	Full	1833D		0-100	6	0.070		96.3	WERL
GAC	Full	237A		0-100	1	10.000		52	WERL
RO	Pilot	180A		0-100		0.110		79	WERL

TABLE 4-13
WASTEWATER TREATMENT PERFORMANE DATA FOR CHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	5	260.000		30	WERL
AS	Full	1B		100-1000	5	250.000		0	WERL
AS	Full	1B		100-1000	5	640.000		0	WERL
AS	Full	6B		100-1000	4	50.000		97	WERL
PACT	Full	6B		1000-10000	3	83.000		98.8	WERL
SS	Full	913	50	50-47700	14	50.000			ITD-L
SS	Full	415T	50	690-42000	15	50.000			ITD-L
SS	Full	6B		10000-100000	2	50.000		99.68	WERL
SS	Full	99.75		10000-100000	15	50.000		99.75	WERL

2-Chloroethyl Vinyl Ether. The only data available for the volatile constituent 2-chloroethyl vinyl ether were incomplete NPDES data from eight facilities. Due to the lack of any other information for this compound the BDAT treatment standard was based on the effluent concentration from facility LA0038245 which represents biological treatment. The resulting BDAT treatment standard for 2-chloroethyl vinyl ether is 35 ppb as shown in Table 4-173.

TABLE 4-14
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2-CHLOROETHYL VINYL ETHER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NJ0028291			2	1.000			NPDES
		LA0066214			15	12.143			NPDES
		LA0068435			13	6.000			NPDES
		MI0045543			10	1.900			NPDES
		LA0065501			6	10.000			NPDES
		KY0003603			1	10.000			NPDES
BT	Full	LA0038245			37	10.811			NPDES
COAG+Sed	Full	PA0013129			1	10.000			NPDES

Chloroform. For the volatile constituent chloroform, several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, AS+Fil, AirS, CAC, CAC+AirS, chemical oxidation (ChOx), GAC, PACT, RO, SS, TF, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for chloroethane is SS and using the ITD median long term average and ITD Option 1 variability factors, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for chloroethane is 46 ppb.

TABLE 4-15
WASTEWATER TREATMENT PERFORMANE DATA FOR CHLOROFORM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1607B		0-100	3	9.000		90.1	WERL
AL	Full	1B		100-1000	6	26.000		96.8	WERL
AL	Pilot	203A		100-1000	14	53.000		61	WERL
AL	Full	141A		100-1000		16.000		92.3	WERL
AL	Full	1607B		100-1000	2	10.000		97.4	WERL
AL	Full	1607B		100-1000	3	130.000		86	WERL
AL	Pilot	203A		100-1000	14	31.000		77	WERL
AS	Full	1B		0-100	3	20.000		80	WERL
AS	Full	6B		100-1000	7	30.000		77	WERL
AS	Full	1B		0-100	5	6.000		86	WERL
AS	Full	6B		100-1000	3	10.000		97.7	WERL
AS	Bench	2020		10000-100000		200.000		99.43	WERL
AS	Full	234A		0-100		1.200		81	WERL
AS	Full	1B		0-100	6	21.000		82	WERL
AS	Full	375E		0-100	7	1.000		75	WERL
AS	Full	1B		100-1000	8	59.000		51	WERL
AS	Full	975B		0-100		2.000		93.8	WERL
AS	Full	234A		0-100		2.300		72	WERL
AS	Full	234A		0-100		0.500		98.4	WERL
AS	Full	6B		100-1000	3	10.000		98.2	WERL
AS	Full	238A		0-100	3	2.400		46	WERL
AS	Full	1607B		100-1000	3	50.000		88	WERL
AS	Full	1607B		1000-10000	2	40.000		96.9	WERL
AS	Pilot	206B		100-1000	20	3.600		97.4	WERL
AS	Full	375E		0-100	7	20.000		78	WERL
AS	Full	1567E		0-100		1.600		65	WERL
AS	Pilot	241B		100-1000	5	44.000		85	WERL
AS	Full	234A		0-100		1.300		84	WERL
AS	Pilot	203A		100-1000	14	18.000		87	WERL
AS	Full	6B		1000-10000	27	19.000		98.7	WERL
AS	Full	201B		0-100	29	36.000		53	WERL
AS	Full	234A		0-100		1.300		65	WERL
AS	Pilot	240A		0-100	14	2.000		98	WERL
AS+Fil	Full	6B		1000-10000	3	10.000		99.41	WERL
AS+Fil	Full	6B		100-1000	14	10.000		95.8	WERL
AirS	Bench	1328E		100000-1000000	5	18000.000		93.1	WERL
AirS	Pilot	369A		0-100		1.400		98.2	WERL
AirS	Pilot	213B		0-100	1	13.000		77	WERL
AirS	Bench	1328E		10000-100000	5	4400.000		83	WERL

TABLE 4-15
WASTEWATER TREATMENT PERFORMANE DATA
FOR CHLOROFORM

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AirS	Pilot	225B		0-100	1	0.130		98.9	WERL
AirS	Bench	17A		0-100		2.800		96.9	WERL
AirS	Bench	17A		1000-10000		110.000		91.7	WERL
AirS	Bench	17A		0-100		3.900		88	WERL
AirS	Bench	17A		100-1000		4.200		98.6	WERL
AirS	Pilot	210B		100-1000	1	1.000		99.2	WERL
AirS	Bench	17A		100-1000		3.700		98.6	WERL
AirS	Bench	1328E		100-1000	5	34.000		64	WERL
AirS	Pilot	434B		1000-10000	4	41.000		98	WERL
CAC	Pilot	203A		100-1000	14	106.000		22	WERL
CAC+AirS	Full	1833D		0-100	25	0.200		89	WERL
ChOx	Bench	640E		100-1000	2	7.000		96	WERL
ChOx	Bench	640E		100-1000	1	3.000		99	WERL
ChOx(Oz)	Pilot	331D		0-100		48.000		37	WERL
ChOx(Oz)	Pilot	331D		0-100		2.800		35	WERL
GAC	Full	1264B		0-100		1.000		87	WERL
GAC	Pilot	331D		0-100		1.000		98.6	WERL
GAC	Full	245B		100-1000	1	10.000		97.6	WERL
GAC	Full	237A		100-1000	1	10.000		98.1	WERL
GAC	Full	245B		100-1000	1	10.000		96.2	WERL
PACT	Bench	242E		0-100		20.000		47	WERL
PACT	Bench	Zimpro		1470	1	1.000		99.9	WAO
PACT	Bench	Zimpro		38	1	20.000		47	WAO
RO	Pilot	190A		0-100		0.890		71	WERL
RO	Full	250B		1000-10000		110.000		94.5	WERL
RO	Full	250B		100-1000		53.000		87	WERL
SCOx	Pilot	65D		100-1000		1.700		99.93	WERL
SS	Full	415T	10	7330-1088000	15	10.500			ITD-L
SS	Full	913	10	28700-200000	14	129.200			ITD-L
SS	Full	6B		100000-1000000	15	10.000		99.99	WERL
SS	Full	6B		10000-100000	2	120.000		99.88	WERL
SS	Full	251B		>1000000	10	6000.000		99.99	WERL
SS	Full	251B		100000-1000000	10	9800.000		96.4	WERL
TF	Pilot	240A		0-100	14	11.000		89	WERL
TF	Full	1B		0-100	4	14.000		66	WERL
TF	Pilot	203A		100-1000	14	102.000		24	WERL
WOx	Bench	Zimpro		4450000	1	3000.000		99.9	WAO
WOx	Bench	Zimpro		270000	1	1000.000		99	WAO

Chloromethane. For the volatile constituent chloromethane, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, AS+Fil, and SS with a technology size of full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for chloromethane is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for chloromethane is 190 ppb.

TABLE 4-16
WASTEWATER TREATMENT PERFORMANE DATA
FOR CHLOROMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CT0000434			5	22,600			NPDES
		KY0003514			1	6,000			NPDES
		PA0011371			9	1,000			NPDES
		LA0004057			22	12,300			NPDES
		MA0005304			21	10,048			NPDES
		IL0001627			9	9,333			NPDES
		NY0202061			29	1,000			NPDES
		NY0075957			13	20,769			NPDES
		NY0008605			15	6,400			NPDES
		NJ0026291			2	1,000			NPDES
		MD0000345			1	10,000			NPDES
		KY0003603			1	10,000			NPDES
		WV0004740			1	10,000			NPDES
		OH0025461			2	21,700			NPDES
		SC0001180			40	8,974			NPDES
		LA0066214			15	11,786			NPDES
		LA0066435			12	6,500			NPDES
		LA0065501			6	10,000			NPDES
		TX0007439			42	3,500			NPDES
AS	Full	1B		100–1000	6	110,000		66	WERL
AS	Full	1B		100–1000	5	11,000		96.3	WERL
AS	Full	1B		100–1000	5	91,000		75	WERL
AS+Fil	Full	6B		0–100	7	50,000		39	WERL
BT	Full	KY0002119			1	10,000			NPDES
BT	Full	LA0036245			38	10,263			NPDES
BT	Full	PA0026689			2	12,100			NPDES
BT	Full	WV0023116			18	16,111			NPDES
Sed+Fil	Full	PA0010502			26	1,306			NPDES
SS	Full	725	50	9440–1290000	13	923,100			ITD-L
SS	Full	6B		100000–1000000	11	50,000		99.96	WERL
SS	Full	251B		10000–100000	10	5,000		99.99	WERL

3-Chloropropylene. For the volatile constituent 3-chloropropylene no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was cis-1,3-dichloropropylene, Third Third Group IIa2b(3). Using a transfer from this constituent results in a BDAT of AS for 3-chloropropylene and a calculated BDAT treatment standard of 21 ppb as shown in Table 4-173.

1,2-Dibromo-3-chloropropane. For the volatile constituent 1,2-dibromo-3-chloropropane (U066) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability group are presented in Appendix B.

The constituent used to transfer treatment performance data was bromomethane, Third Third Group III A2e. Using a transfer from this constituent results in a BDAT of AS for 1,2-dibromo-3-chloropropane and a calculated BDAT treatment standard of 65 ppb as shown in Table 4-173.

__1,2-Dibromoethane__. The data available for the volatile constituent 1,2-dibromoethane were compiled from the WERL database. Demonstrated treatment technologies included AirS and RO. The technology size included pilot-scale data only. The resulting effluent concentrations ranged from 0.06 ppb to 7.0 ppb with a detection limit for 1,2-dibromoethane established at 4.8 ppb (see Table A-1).

The BDAT standard was set using the AirS technology and an achievable effluent of 4.8 ppb, the compound detection limit. AirS was selected based on its high % removal and ability to treat the wastewater to a less than detection limit concentration.

The resulting BDAT treatment standard for 1,2-dibromoethane is 16 ppb as shown in Table 4-173.

TABLE 4-17
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,2-DIBROMOETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AirS	Pilot	218B		0-100	1	0.060		96.5	WERL
RO	Pilot	323B		0-100	1	7.000		15	WERL

Dibromomethane. For the volatile constituent dibromomethane (U068) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was bromomethane, Third Third Group IIIA2e. Using a transfer from this constituent results in a BDAT of AS for dibromomethane and a calculated BDAT treatment standard of 65 ppb as shown in Table 4-173.

Trans-1,4-Dichloro-2-butene. For the volatile constituent trans-1,4-dichloro-2-butene no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 1,3-dichloropropylene, Third Third Group IIA2b(3). Using a transfer from this constituent results in a BDAT of AS for trans-1,4-dichloro-2-butene and a calculated BDAT treatment standard of 21 ppb as shown in Table 4-173.

Dichlorodifluoromethane. The data available for the volatile constituent dichlorodifluoromethane were compiled from the WERL and NPDES databases. The demonstrated treatment technology consisted of AS. The data were for full-scale resulting in an effluent concentration of 40 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 40 ppb. AS was selected since this was the only technology presented in WERL and WERL data is preferred over incomplete NPDES data.

The resulting BDAT treatment standard for dichlorodifluoromethane is 130 ppb as shown in Table 4-173.

TABLE 4-18
WASTEWATER TREATMENT PERFORMANE DATA
FOR DICHLORODIFLUOROMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		AZ0000108			11	0.848			NPDES
		AZ0000108			11	1.000			NPDES
		AZ0000108			11	1.000			NPDES
		NY0166511			2	7.500			NPDES
		NY0060534			5	1.000			NPDES
		NJ0028291			2	1.000			NPDES
AS	Full	18		0-100	4	40.000		33	WERL

1,1-Dichloroethane. For the volatile constituent 1,1-dichloroethane, several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, AirS, AirS+GAC, CAC, GAC, PACT, RO, SS, and TF, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for 1,1-dichloroethane is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for 1,1-dichloroethane is 59 ppb.

TABLE 4-19
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,1-DICHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	14	19,000		87	WERL
AL	Pilot	203A		100-1000	14	45,000		69	WERL
AL	Full	1B		0-100	2	10,000		88	WERL
AS	Pilot	203A		100-1000	14	8,000		94.4	WERL
AS	Pilot	240A		0-100	14	2,000		97.5	WERL
AirS	Pilot	222B		0-100	1	0,300		97.5	WERL
AirS	Pilot	1362E		1000-10000	3	630,000		75	WERL
AirS+GAC	Full	229A		0-100	19	1,000		97.4	WERL
CAC	Pilot	203A		100-1000	14	111,000		23	WERL
GAC	Bench	1362E		1000-10000		1,000		99.97	WERL
GAC	Full	1264B		0-100		1,000		80	WERL
PACT	Bench	Zimpro		640	1	1,000		99.8	WAO
RO	Full	250B		1000-10000		84,000		92.4	WERL
RO	Full	250B		100-1000		64,000		89	WERL
RO	Full	250B		0-100		3,000		95.4	WERL
SS	Full	913	10	3400-13900	14	10,000			ITD-L
SS	Full	251B		10000-100000	10	10,000		99.9	WERL
SS	Full	6B		1000-10000	2	10,000		99.9	WERL
TF	Pilot	240A		0-100	14	7,000		91.3	WERL
TF	Pilot	203A		100-1000	14	94,000		35	WERL

1,2-Dichloroethane. For the volatile constituent 1,2-dichloroethane, several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AL+AS, AS, AS+Fil, AirS, CAC, PACT, RO, SS, TF, and WOx with a technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for 1,2-dichloroethane is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for 1,2-dichloroethane is 211 ppb.

TABLE 4-20
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,2-DICHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	14	15.000		90.2	WERL
AL	Full	1B		1000-10000	8	10.000		99.75	WERL
AL	Pilot	203A		100-1000	14	45.000		71	WERL
AL+AS	Full	233D		1000-10000	21	8.000		99.67	WERL
AS	Pilot	203A		100-1000	14	22.000		86	WERL
AS	Pilot	241B		100-1000	3	140.000		57	WERL
AS	Full	1B		1000-10000	8	4400.000		33	WERL
AS	Full	6B		100-1000	3	12.000		98.1	WERL
AS	Pilot	240A		0-100	13	5.000		94.3	WERL
AS	Full	6B		1000-10000	25	29.000		98.8	WERL
AS	Full	375E		100-1000	7	74.000		82	WERL
AS	Bench	202D		100000-1000000		3700.000		98.6	WERL
AS	Full	1B		10000-100000	6	1800.000		89	WERL
AS	Full	6B		100-1000	13	94.000		84	WERL
AS	Full	6B		100-1000	12	15.000		98.5	WERL
AS+Fil	Full	6B		10000-100000	3	1200.000		98.5	WERL
AirS	Full	322B		100-1000	5	55.000		89	WERL
AirS	Full	322B		1000-10000	5	189.000		91.8	WERL
CAC	Pilot	203A		100-1000	14	109.000		29	WERL
PACT	Bench	Zimpro		210	1	1.000		99.5	WAO
RO	Full	250B		1000-10000		350.000		84	WERL
RO	Full	250B		0-100		13.000		79	WERL
RO	Pilot	323B		0-100	1	32.000		37	WERL
RO	Full	250B		100-1000		43.000		76	WERL
SS	Full	415T	10	2339900-2347600	15	56.100			ITD-L
SS	Full	913	10	172000-327000	14	73.300			ITD-L
SS	Full	251B		>1000000	10	97.000		99.99	WERL
SS	Full	6B		>1000000	15	56.000		99.99	WERL
SS	Full	6B		100000-1000000	2	50.000		99.98	WERL
TF	Pilot	240A		0-100	13	12.000		88	WERL
TF	Full	375E		100-1000	7	45.000		85	WERL
TF	Pilot	203A		100-1000	14	93.000		39	WERL
WOx	Bench	Zimpro		6260000	1	13000.000		99.8	WAO
WOx (B)	Bench	1054E		>1000000		230000.000		93.6	WERL

1,1-Dichloroethylene. For the volatile constituent 1,2-dichloroethylene, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, AirS, CAC, GAC, RO, SS, and TF with technology sizes including pilot and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for 1,1-dichloroethylene is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for 1,1-dichloroethylene is 25 ppb.

TABLE 4-21
WASTEWATER TREATMENT PERFORMANE DATA FOR 1,1-DICHLOROETHYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	14	83,000		81	WERL
AL	Pilot	203A		100-1000	14	35,000		84	WERL
AS	Full	6B		100-1000	3	10,000		97.2	WERL
AS	Pilot	208B		0-100	20	0.200		99.75	WERL
AS	Full	201B		0-100	2	1,000		97.5	WERL
AS	Pilot	203A		100-1000	14	14,000		93.4	WERL
AS	Full	1B		0-100	2	5,000		86	WERL
AS	Full	6B		100-1000	22	10,000		97	WERL
AS	Full	1B		0-100	2	6,000		92.9	WERL
AS	Pilot	240A		0-100	12	1,000		98.3	WERL
AS	Full	6B		100-1000	3	25,000		97	WERL
AirS	Pilot	217B		0-100	1	0.300		95.8	WERL
AirS	Pilot	222B		0-100	1	1,000		92.3	WERL
AirS	Pilot	1382E		1000-10000	3	4,000		99.82	WERL
AirS	Full	1344E		1000-10000		2,000		99.94	WERL
AirS	Pilot	1139E		100-1000	6	7,400		92.7	WERL
AirS	Pilot	1139E		0-100	2	1,000		98.6	WERL
CAC	Pilot	203A		100-1000	14	150,000		29	WERL
GAC	Full	237A		0-100	1	10,000		64	WERL
GAC	Full	1264B		0-100		1,000		70	WERL
GAC	Full	1139E		0-100		1,000		97	WERL
RO	Full	250B		0-100		1,200		98.4	WERL
RO	Full	250B		0-100		3,100		72	WERL
RO	Full	250B		1000-10000		240,000		78	WERL
SS	Full	251B		1000-10000	10	10,000		99.79	WERL
SS	Full	6B		1000-10000	2	10,000		99.87	WERL
SS	Full	6B		1000-10000	15	10,000		99.77	WERL
SS	Full	415T	10	200-10800	15	10,200			ITD-L
SS	Full	913	10	2900-12300	14	10,000			ITD-L
TF	Pilot	240A		0-100	12	1,000		98.3	WERL
TF	Pilot	203A		100-1000	14	85,000		60	WERL

Trans-1,2-Dichloroethylene. For the volatile constituent trans-1,2-dichloroethylene, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, AS+Fil, AirS, GAC, RO, SS, and TF with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for trans-1,2-dichloroethylene is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for trans-1,2-dichloroethylene is 54 ppb.

TABLE 4-22
WASTEWATER TREATMENT PERFORMANE DATA FOR TRANS-1,2-DICHLOROETHYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0-100	3	7.000		88	WERL
AS	Full	1B		0-100	4	3.000		93.5	WERL
AS	Full	1B		0-100	5	8.000		71	WERL
AS+Fil	Full	6B		100-1000	3	78.000		81	WERL
AirS	Bench	1328E		1000-10000	5	1500.000		80	WERL
AirS	Pilot	1362E		1000-10000	3	1.300		99.9	WERL
AirS	Pilot	71D		100-1000	1	5.000		98.1	WERL
AirS	Pilot	1363E		100-1000		5.000		95.2	WERL
AirS	Bench	1328E		100000-1000000	5	17000.000		84	WERL
GAC	Full	245B		100-1000	1	10.000		92.5	WERL
RO	Full	250B		10000-100000		8000.000		84	WERL
SS	Full	415T	10	4880-43000	15	14.100			ITD-L
SS	Full	913	10	14100-70300	14	10.000			ITD-L
SS	Full	6B		10000-100000	15	14.000		99.9	WERL
SS	Full	6B		10000-100000	2	10.000		100	WERL
TF	Full	1B		0-100	5	1.000		97.9	WERL

1,2-Dichloropropane. The data available for the volatile constituent 1,2-Dichloropropane were compiled from the WERL database. Demonstrated treatment technologies included AS, AirS, ozonation (ChOx(Oz)), and GAC. The technology size included full, pilot, and bench-scale data. The resulting effluent concentrations ranged from 0.500 ppb to 1,800 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 148.4 ppb. AS was selected based on the technology having full-scale data at various high influent ranges with substantial treatment removals. The effluent value of 148.4 ppb is an average of the AS effluent concentrations presented for full-scale treatment.

The resulting BDAT treatment standard for 1,2-dichloropropane is 482 ppb as shown in Table 4-173.

TABLE 4-23
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,2-DICHLOROPROPANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	15	490.000		37	WERL
AS	Bench	2020		100000-1000000		1800.000		99.01	WERL
AS	Pilot	241B		100-1000	5	61.000		76	WERL
AS	Full	1B		1000-10000	1	1.000		99.96	WERL
AS	Full	6B		1000-10000	3	180.000		98.2	WERL
AS	Full	6B		1000-10000	3	60.000		98.7	WERL
AS	Pilot	206B		100-1000	20	6.000		98.1	WERL
AS	Full	6B		100-1000	24	11.000		98.2	WERL
AirS	Pilot	222B		0-100	1	0.500		75	WERL
AirS	Pilot	1362E		100-1000	3	2.700		99	WERL
ChOx(Oz)	Pilot	331D		0-100		3.000		33	WERL
ChOx(Oz)	Pilot	331D		0-100		4.800		21	WERL
GAC	Pilot	331D		0-100		1.000		84	WERL
WOx	Pilot	Zimpro	150	550000-630000	3	1607.000			WAO

Trans-1,3-Dichloropropylene. The data available for trans-1,3-dichloropropylene were compiled from the WERL database. The data were presented as 1,3-dichloropropylene because the database did not identify individual isomers. The data were therefore used for both trans and cis-1,3-dichloropropylene. Demonstrated treatment technologies included AL, AS, and TF. The technology size was full-scale with resulting effluent concentrations ranging from 1 ppb to 10 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 6.35 ppb. AS was selected as BDAT since the data presented for AS were at a higher influent concentration while maintaining similar removal rates. The 6.35 ppb was the average of the effluent concentration values presented for AS full-scale treatment.

The resulting BDAT treatment standard for trans-1,3-dichloropropylene is 21 ppb as shown in Table 4-173.

__Cis-1,3-Dichloropropylene__. The data available for the volatile constituent cis-1,3-dichloropropylene compiled from the WERL database. The data were presented as 1,3-dichloropropylene because the database did not identify individual isomers. The data were therefore used for both cis and trans-1,3-dichloropropylene. Demonstrated treatment technologies included AL, AS, and TF. The technology size included was full-scale with resulting effluent concentrations ranging from 1 ppb to 10 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 6.35 ppb. AS was selected as BDAT since the data presented for AS were at a higher influent concentration while maintaining similar removal rates as the lower concentrations. The 6.35 ppb was the average of the effluent concentration values presented for AS full-scale treatment.

The resulting BDAT treatment standard for cis-1,3-dichloropropylene is 21 ppb as shown in Table 4-173.

4-24
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,3-DICHLOROPROPYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	8B		100-1000	3	83,000		88	WERL
AS	Full	975B		100-1000		2,700		97.8	WERL
AS	Full	6B		100-1000	23	10,000		97.4	WERL
TF	Full	1B		0-100	1	1,000		99	WERL

1,4-Dioxane. The data available for the volatile constituent 1,4-dioxane were compiled from the NPDES database and the WAO test. The demonstrated treatment technology for the data was WOx. The technology size was pilot scale. The resulting effluent concentrations ranged from not detected to 2,188 ppb.

The BDAT standard was set using the WOx technology and an achievable effluent of 10,000 ppb (the detection limit established in the WAO test). WOx was selected as BDAT since it showed substantial treatment by a demonstrated technology.

The resulting BDAT treatment standard for 1,4-dioxane is 28,000 ppb as shown in Table 4-173.

Ethyl Acetate. The data available for the volatile constituent ethyl acetate were compiled from the WERL database. The demonstrated treatment technology was AS. The data were for a bench-scale study resulting in effluent concentrations of 60 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 60 ppb. AS was selected since it was the only technology reported for ethyl acetate and is a proven wastewater treatment technology.

The resulting BDAT treatment standard for ethyl acetate is 195 ppb as shown in Table 4-173.

TABLE 4-25
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,4-DIOXANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CT0001341			21	2188.100			NPDES
		SC0000400			24	489.500			NPDES
WOx	Pilot	Zimpro	10000	1200000-1300000	3	ND			WAO

TABLE 4-26
WASTEWATER TREATMENT PERFORMANE DATA
FOR ETHYL ACETATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	2020		1000-10000		80.000		98.4	WERL
WOx	Pilot	Zimpro	130	630000-770000	3	580.000			WAO

Ethylbenzene. The data available for the volatile constituent ethylbenzene were compiled from the WERL database, BDAT database and WAO data. Demonstrated treatment technologies included almost if not all the treatment technologies available. The technology size included full, pilot and bench-scale data with resulting effluent concentrations ranging from 0.100 ppb to 3,550 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 10 ppb. BT was selected based on the full-scale data developed for BDAT using BDAT guidelines. This is supported by the repeatability of that value for the BT effluent concentration. The full-scale AS data from WERL database also substantiates the BT selection.

The resulting BDAT treatment standard for ethylbenzene is 32 ppb as shown in Table 4-173.

TABLE 4-27
WASTEWATER TREATMENT PERFORMANE DATA FOR ETHYL BENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	14	12.000		89	WERL
AL	Pilot	203A		100-1000	14	27.000		76	WERL
AL	Full	1B		0-100	4	10.000		69	WERL
AL+AS	Full	2330		1000-10000	21	4.000		99.93	WERL
API+DAF+AS	Full	1482D		10000-100000	4	3.300		99.98	WERL
AS	Bench	200B		100-1000	6	0.700		99.89	WERL
AS	Full	201B		0-100	16	6.000		92.8	WERL
AS	Pilot	208B		0-100	20	0.200		99.76	WERL
AS	Full	6B		100-1000	3	10.000		98.2	WERL
AS	Full	238A		0-100	3	0.500		97.2	WERL
AS	Pilot	240A		0-100	14	1.000		98.4	WERL
AS	Full	6B		100-1000	24	10.000		94.4	WERL
AS	Full	234A		0-100		0.200		99.14	WERL
AS	Full	234A		0-100		0.200		99.22	WERL
AS	Bench	202D		10000-100000		80.000		99.87	WERL
AS	Full	6B		1000-10000	4	10.000		99.47	WERL
AS	Full	975B		1000-10000		8.000		99.8	WERL
AS	Full	1B		0-100	6	9.000		90.7	WERL
AS	Full	975B		100-1000		10.000		98.4	WERL
AS	Full	1B		0-100	4	3.000		89	WERL
AS	Pilot	241B		100-1000	5	5.000		97.8	WERL
AS	Full	1B		0-100	3	5.000		89	WERL
AS	Full	1B		0-100	5	1.000		98.1	WERL
AS	Full	1B		0-100	4	1.000		97.7	WERL
AS	Full	1B		0-100	5	5.000		79	WERL
AS	Full	6B		1000-10000	3	25.000		98.7	WERL
AS	Full	1B		0-100	3	3.000		95.4	WERL
AS	Full	975B		0-100		8.000		87	WERL
AS	Pilot	203A		100-1000	14	6.000		94.8	WERL
AS	Pilot	REF2		23500	8	366.000			BDAT
AS	Full	1B		100-1000	6	4.000		97.5	WERL
AS	Full	1B		100-1000	3	2.000		99.26	WERL
AS	Full	1B		100-1000	4	1.000		99.17	WERL
AS	Bench	200B		0-100	9	0.500		99.5	WERL
AS	Full	6B		100-1000	7	10.000		97.9	WERL
AS	Full	6B		100-1000	15	10.000		98.9	WERL
AS	Full	6B		100-1000	29	10.000		97.4	WERL
AS	Full	1B		0-100	4	8.000		89	WERL
AS	Full	6B		10000-100000	7	10.000		99.97	WERL
AS	Bench	200B		100-1000	12	0.600		99.5	WERL

TABLE 4-27
WASTEWATER TREATMENT PERFORMANE DATA
FOR ETHYL BENZENE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS+Fil	Full	6B		0-100	15	10.000		90	WERL
AirS	Pilot	224B		0-100	1	0.500		91.9	WERL
AirS	Full	89A		0-100		0.300		94.1	WERL
AirS+GAC	Full	229A		0-100	19	1.000		80	WERL
BT	Full	P211		12923-80000	7	10.000			BDAT
BT	Full	P234		10-3850	33	10.000			BDAT
BT	Full	P221		10-140	3	10.000			BDAT
BT	Full	P293		2287-3565	2	10.000			BDAT
BT	Full	P238		220-3350	2	10.000			BDAT
BT	Full	P215		584-4150	3	10.000			BDAT
BT	Full	P242		190-553	2	10.000			BDAT
BT	Full	P244		808	1	10.000			BDAT
BT	Full	P257		63-3648	27	12.000			BDAT
BT	Full	P202		96-598	20	10.000			BDAT
BT	Full	P230		101-3040	15	10.000			BDAT
BT	Full	P299		22-230	18	10.000			BDAT
BT	Full	P251		1235-1360	3	10.000			BDAT
BT	Full	P253		10-144	2	10.000			BDAT
CAC	Pilot	203A		100-1000	14	73.000		34	WERL
GAC	Full	1421D		0-100		0.100		37	WERL
PACT	Bench	242E		0-100		5.000		78	WERL
PACT	Bench	Zimpro		185	1	1.000		99.5	WAO
PACT	Bench	200B		0-100	11	0.400		99.57	WERL
PACT	Bench	Zimpro		21	1	5.000		78	WAO
RO	Pilot	180A		0-100		0.020		71	WERL
RO	Pilot	250B		0-100		5.000		92.9	WERL
RO	Full	250B		1000-10000		170.000		97	WERL
SS	Pilot	REF2		23500	5	208.000			BDAT
TF	Pilot	240A		0-100	14	1.000		98.4	WERL
TF	Pilot	203A		100-1000	14	31.000		72	WERL
TF	Full	1B		100-1000	4	11.000		90.8	WERL
TF	Full	1B		0-100	4	4.000		90.9	WERL
UF	Pilot	250B		100-1000		70.000		59	WERL
WOx	Full	Zimpro	50	19000-27000	2	3550.000			WAO
WOx	Full	242E		1000-10000		21.000		99.65	WERL
WOx (B)	Bench	1054E		1000-10000		500.000		94.6	WERL
WOx (B)	Bench	1054E		100000-1000000		30000.000		97	WERL

Ethyl Cyanide. The data available for the volatile constituent ethyl cyanide were compiled from the WERL database. Demonstrated treatment technologies included both solvent extraction (SExt) and WOx. The technology size included pilot and bench-scale data. The resulting effluent concentrations ranged from 7,000 ppb to 38,000 ppb.

The BDAT standard was set using WOx technology and an achievable effluent of 7,000 ppb. WOx was selected based on the removal achieved. Also, the data for SExt as presented in the WERL database was given a poor rating and therefore should not be used for setting BDAT treatment standards.

The resulting BDAT treatment standard for ethyl cyanide is 23,000 ppb as shown in Table 4-173.

Ethyl Ether. The data available for the volatile constituent ethyl ether were compiled from the WERL database. The only demonstrated treatment technology was full-scale RO treatment. The resulting effluent concentrations ranged from 17 ppb to 24 ppb.

The BDAT standard was set using the RO technology and an achievable effluent of 20.5 ppb. RO was selected as the BDAT since it was the only reported technology. The 20.5 ppb effluent value is the average of the data presented.

The resulting BDAT treatment standard for ethyl ether is 67 ppb as shown in Table 4-173.

TABLE 4-28
WASTEWATER TREATMENT PERFORMANE DATA FOR ETHYL CYANIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
SExt	Pilot	1092E		10000-100000		38000.000		55	WERL
WOx (B)	Bench	78D		100000-1000000		7000.000		98.2	WERL

TABLE 4-29
WASTEWATER TREATMENT PERFORMANE DATA FOR ETHYL ETHER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
RO	Full	250B		100-1000		17.000		88	WERL
RO	Full	250B		100-1000		24.000		92.8	WERL

Ethyl Methacrylate. For the volatile constituent ethyl methacrylate (U118) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was methylisobutylketone, Third Third Group III A3e. Using a transfer from this constituent results in a BDAT of SS for ethyl methacrylate and a calculated BDAT treatment standard of 32 ppb as shown in Table 4-173.

Ethylene Oxide. For the volatile constituent ethylene oxide (U115) no wastewater treatment performance data were available which indicate treatment of this constituent. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 1,4-dioxane, Third Third Group IIIA3e. Using a transfer from this constituent results in a BDAT of WOx for ethylene oxide and a calculated BDAT treatment standard of 127,400 ppb as shown in Table 4-173.

TABLE 4-30
WASTEWATER TREATMENT PERFORMANE DATA
FOR ETHYLENE OXIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MI0042811			20	1457800.000			NPDES

Iodomethane. For the volatile constituent iodomethane (U138) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was chloromethane, Third Third Group III A2f(5). Using a transfer from this constituent results in a BDAT of SS for iodomethane and a calculated bDAT treatment standard of 162 ppb as shown in Table 4-173.

Isobutyl Alcohol. For the volatile constituent isobutyl alcohol no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was n-butyl alcohol, Third Third Group IIIA3e. Using a transfer from this constituent results in a BDAT of AS for isobutyl alcohol and a calculated BDAT treatment standard of 125 ppb as shown in Table 4-173.

Methanol. The data available for the volatile constituent methanol were compiled from WERL database and WAO data. Demonstrated treatment technologies included PACT, SS, and WOx. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 10 ppb to 290,000 ppb.

The BDAT standard was set using PACT technology and an achievable effluent of 10 ppb. PACT was selected being the more proven technology with the lowest achievable effluent concentration of the data presented. The resulting BDAT treatment standard for methanol is 33 ppb as shown in Table 4-173.

TABLE 4-31
WASTEWATER TREATMENT PERFORMANE DATA
FOR METHANOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
PACT	Bench	Zimpro		208000	1	10.000		99.99	WAO
SS	Pilot	1082E		>1000000		230000.000		84	WERL
WOx	Full	242E		>1000000		210000.000		89.6	WERL
WOx (B)	Bench	780		>1000000		290000.000		91	WERL

Methyl Ethyl Ketone. The data available for the volatile constituent methyl ethyl ketone were compiled from NPDES database, WERL database, and WAO data. Demonstrated treatment technologies included AS, PACT, and WOx. The technology size included full, pilot, and bench-scale with resulting effluent concentrations ranging from 0.01 ppb to 27,000 ppb.

The BDAT standard was set using PACT technology and an achievable effluent of 5 ppb. The only data available on full-scale is WOx technology. Although the WOx data had high effluent concentrations, PACT a more proven and acceptable technology reported better effluent data. Therefore the PACT technology was selected and effluent concentration determined using the average of reported data. The resulting BDAT treatment standard for methyl ethyl ketone is 16 ppb as shown in Table 4-173.

TABLE 4-32
WASTEWATER TREATMENT PERFORMANE DATA
FOR METHYL ETHYL KETONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0096792			8	3.400			NPDES
		NY0072231			10	39.400			NPDES
		IN0036072			14	779.360			NPDES
		NH0001503			1	27000.000			NPDES
AS	Pilot	241B		100-1000	5	9.000		98.6	WERL
AS	Pilot	252E		100000-1000000	6	900.000		99.7	WERL
AS	Pilot	252E		10000-100000	7	500.000		99	WERL
PACT	Bench	Zimpro		2300	1	14.000		99.39	WAO
PACT	Bench	Zimpro		266	1	1.000		99.6	WAO
PACT	Bench	Zimpro		300	1	0.010		99.9	WAO
WOx	Pilot	Zimpro		6000000	1	1000.000		99.9	WAO
WOx	Full	242E		>1000000		2300.000		99.9	WERL
WOx (B)	Bench	780		>1000000		1000.000		99.9	WERL
WOx (B)	Bench	780		100000-1000000		1000.000		99.8	WERL

Methyl Isobutyl Ketone. The data available for the volatile constituent methyl isobutyl ketone were compiled from the WERL and NPDES databases and the BDAT database. Demonstrated treatment technologies included AS, RO, SS, and WOx. The technology size included full and pilot-scale data. The resulting effluent concentrations ranged from 5 ppb to 70,900 ppb.

The BDAT standard was set using SS technology and an achievable effluent of 10 ppb. SS was selected since the data, although not full-scale, were developed for BDAT using BDAT guidelines. The achievable effluent is consistent with the other data, except for the two high effluent concentration points.

The resulting BDAT treatment standard for methyl isolbutyl ketone is 32 ppb as shown in Table 4-173.

Methyl Methacrylate. For the volatile constituent methyl methacrylate no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was methyl isobutyl ketone, Third Third Group III A3e. Using a transfer from this constituent results in a BDAT of SS for methyl methacrylate and a calculated BDAT treatment standard of 32 ppb as shown in Table 4-173.

TABLE 4-33
WASTEWATER TREATMENT PERFORMANE DATA
FOR METHYL ISOBUTYL KETONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NH0001503			1	70900.000			NPDES
AS	Pilot	REF2		76400	8	41817.000			BDAT
AS	Pilot	241B		100-1000	4	6.000		98.1	WERL
RO	Full	250B		100-1000		15.000		89.9	WERL
SS	Pilot	REF2		76400	5	10.000			BDAT
WOx	Full	242E		100000-1000000		5.000		99.99	WERL
WOx	Pilot	Zimpro	4800	620000-630000	3	12133.000			WAO

Methacrylonitrile. The data available for the volatile constituent methacrylonitrile were compiled from the WAO test. The demonstrated treatment technology for the data was WOx. The technology size was pilot scale, with the resulting effluent concentrations not detected.

The BDAT standard was set using the WOx technology and an achievable effluent of 10,000 ppb (the detection limit established in the WAO test). WOx was selected as BDAT since it showed substantial treatment by a demonstrated technology.

The resulting BDAT treatment standard for methacrylonitrile is 28,000 ppb as shown in Table 4-173.

TABLE 4-34
WASTEWATER TREATMENT PERFORMANE DATA
FOR METHACRYLONITRILE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
WOx	Pilot	Zimpro	10000	1100000-1300000	3	ND			WAO

Methylene Chloride. For the volatile constituent methylene chloride, several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, AS+Fil, AirS, AirS+GAC, BT, BT+AC, CAC+AirS, GAC, PACT, RO, SS, TF, and WOx with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for methylene chloride is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for methylene chloride is 89 ppb.

TABLE 4-35
WASTEWATER TREATMENT PERFORMANE DATA
FOR METHYLENE CHLORIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0–100	3	23.000		64	WERL
AS	Full	1B		0–100	3	17.000		72	WERL
AS	Full	1B		0–100	4	31.000		31	WERL
AS	Full	234A		0–100		2.000		93.3	WERL
AS	Full	201B		0–100	27	45.000		51	WERL
AS	Full	975B		0–100		0.430		92	WERL
AS	Full	1B		0–100	3	9.000		75	WERL
AS	Full	1B		100–1000	6	48.000		69	WERL
AS	Full	1B		100–1000	6	130.000		54	WERL
AS	Full	1B		0–100	4	23.000		57	WERL
AS	Full	6B		0–100	3	10.000		77	WERL
AS	Full	1B		0–100	4	61.000		34	WERL
AS	Full	238A		0–100	3	11.000		78	WERL
AS	Full	234A		0–100		4.900		56	WERL
AS	Bench	202D		100000–1000000		510.000		99.72	WERL
AS	Full	375E		0–100	7	10.000		69	WERL
AS	Full	6B		1000–10000	40	54.000		98.6	WERL
AS	Full	1B		0–100	5	16.000		72	WERL
AS	Full	6B		1000–10000	10	31.000		99.53	WERL
AS	Full	1B		0–100	3	23.000		74	WERL
AS	Full	6B		1000–10000	3	10.000		99.74	WERL
AS	Full	1B		0–100	6	17.000		77	WERL
AS	Full	1B		1000–10000	5	58.000		97.8	WERL
AS	Full	6B		0–100	10	13.000		79	WERL
AS	Full	1B		100–1000	5	560.000		31	WERL
AS	Pilot	206B		100–1000	20	4.000		96.6	WERL
AS	Full	1168E		10000–100000		920.000		98.4	WERL
AS	Full	234A		100–1000		0.800		99.5	WERL
AS	Full	1B		10000–100000	5	12000.000		14	WERL
AS	Full	1B		0–100	4	17.000		64	WERL
AS	Pilot	241B		100–1000	5	110.000		78	WERL
AS	Full	375E		0–100	7	5.000		80	WERL
AS	Full	1B		0–100	6	61.000		34	WERL
AS	Full	375E		1000–10000	7	55.000		99.3	WERL
AS	Full	1B		1000–10000	5	2000.000		5	WERL
AS	Full	1B		0–100	5	82.000		35	WERL
AS	Full	375E		0–100	7	20.000		64	WERL
AS+Fil	Full	6B		0–100	9	29.000		26	WERL
AirS	Pilot	205E		100–1000		3.000		99.6	WERL
AirS	Pilot	1362E		100–1000	3	5.300		99	WERL
AirS+GAC	Full	229A		100–1000	19	1.000		99.8	WERL

TABLE 4-35

WASTEWATER TREATMENT PERFORMANE DATA
FOR METHYLENE CHLORIDE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	P248		27-3807	13	11,000			BDAT
BT	Full	P265		500-750	3	27,000			BDAT
BT+AC	Full	P248		10-5550	28	10,000			BDAT
CAC+AirS	Full	1833D		0-100	25	2,400		92.3	WERL
GAC	Full	245B		100-1000	1	10,000		99	WERL
GAC	Full	237A		100-1000	1	10,000		94.4	WERL
PACT	Bench	242E		0-100		20,000		76	WERL
PACT	Bench	Zimpro		84	1	20,000		76	WAO
RO	Full	250B		100-1000		80,000		66	WERL
RO	Full	250B		10000-100000		15000,000		44	WERL
SS	Full	725	10	10-5100	13	217,300			ITD-L
SS	Full	913	10	200-10400	14	10,000			ITD-L
SS	Full	415T	10	198-12100	15	10,500			ITD-L
SS	Full	6B		1000-10000	15	10,000		99.52	WERL
SS	Full	251B		1000-10000	10	10,000		99.17	WERL
SS	Full	251B		>1000000	10	11,000		100	WERL
SS	Full	6B		1000-10000	9	78,000		95.1	WERL
SS	Full	P12003		225000-12000000	40	24413,000			BDAT
SS	Full	6B		100-1000	2	10,000		99	WERL
SS	Full	P284		198-12100	15	10,000			BDAT
TF	Full	1B		0-100	5	20,000		67	WERL
TF	Full	375E		0-100	7	12,000		8	WERL
TF	Full	1B		0-100	3	23,000		36	WERL
TF	Full	1B		0-100	5	58,000		40	WERL
TF	Full	1B		0-100	5	21,000		77	WERL
TF	Full	1B		100-1000	6	16,000		89	WERL
TF	Full	1B		100-1000	4	120,000		56	WERL
TF	Full	375E		100-1000	7	21,000		88	WERL
TF	Full	1B		100-1000	5	37,000		66	WERL
WOx		REF10		15000-3600000	3	5000,000			BDAT
WOx	Pilot	Zimpro		60000	1	10,000		99.9	WAO
WOx	Pilot	78D		10-100		10,000		99.98	WERL
WOx	Full	242E		100000-1000000		84,000		99.99	WERL

__Pyridine__. The data available for the volatile constituent pyridine were compiled from the WERL database and WAO data. Demonstrated treatment technologies included AS, AnFF, and WOx. The technology size included pilot and bench-scale data. The resulting effluent concentrations ranged from 0.9 ppb to 570,000 ppb with a detection limit for pyridine established at 2.4 ppb (see Table A-1).

The BDAT standard was set using AnFF technology and an achievable effluent of 2.4 ppb (the detection limit). AnFF was selected as BDAT since this demonstrated biological treatment technology showed substantial treatment to levels below the detection limit.

The resulting BDAT treatment standard for pyridine is 8 ppb is shown in Table 4-173.

__1,1,1,2-Tetrachloroethane__. The data available for the volatile constituent 1,1,1,2-tetrachloroethane were compiled from the WAO data. The demonstrated treatment technology was PACT with only bench-scale data available.

The BDAT standard was set using the PACT technology and an achievable effluent of 10 ppb since this was the only data available for this constituent. The resulting BDAT treatment standard for 1,1,1,2-tetrachloroethane is 32 ppb as shown in Table 4-173.

TABLE 4-36
WASTEWATER TREATMENT PERFORMANE DATA
FOR PYRIDINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	1054E		1000-10000		1900.000		37	WERL
AnFF	Pilot	235D		1000-10000		0.900		99.9	WERL
WOx	Bench	Zimpro		3910000	1	570000.000		85.4	WAO

TABLE 4-37
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,1,1,2-TETRACHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
PACT	Bench	Zimpro		38	1	10.000		72	WAO

1,1,2,2-Tetrachloroethane. The data available for the volatile constituent 1,1,2,2-tetrachloroethane were compiled from the WERL and NPDES databases. Demonstrated treatment technologies included AS, AirS, BT, and GAC. The technology size included full, pilot, and bench-scale data. The resulting effluent concentrations ranged from 0.0005 ppb to 11,000 ppb.

The BDAT standard was set using GAC technology and an achievable effluent of 10 ppb. GAC was selected based on its proven track record as a treatment technology. Also, the data as presented were for full-scale and for the higher influent concentration range. In addition, WERL data are preferred over incomplete NPDES data.

The resulting BDAT treatment standard for 1,1,2,2-tetrachloroethane is 32 ppb as shown in Table 4-173.

TABLE 4-38
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,1,2,2-TETRACHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0007048			9	1.560			NPDES
		NJ0028291			2	1.000			NPDES
		LA0068435			13	7.570			NPDES
		LA0066214			15	5.000			NPDES
		LA0065501			6	5.000			NPDES
		NJ0030392			4	0.005			NPDES
AS	Bench	2020		100000–1000000		11000.000		94.5	WERL
AS	Full	1B		0–100	2	3.000		93.5	WERL
AirS	Pilot	1363E		100–1000		4.800		98	WERL
AirS	Pilot	71D		100–1000	1	41.000		95.5	WERL
BT	Full	LA0038245			38	5.313			NPDES
GAC	Full	245B		1000–10000	1	10.000		99.1	WERL

Tetrachloroethylene. For the volatile constituent tetrachloroethylene several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, AS+Fil, BT, CAC+AirS, ChOX, chemical reduction (Chred), GAC, PACT, RO, SS, TF, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for tetrachloroethylene is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for tetrachloroethylene is 56 ppb.

2 OF 4

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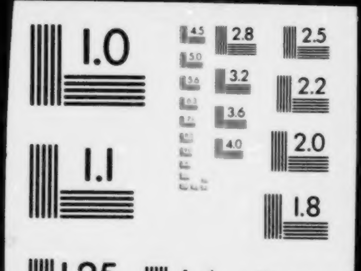

1.0
4.5
5.0
5.6
6.3
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.1
1.8
1.25
1.4
1.6

4-39
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR TETRACHLOROETHYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0–100	8	10,000		80	WERL
AS	Full	1B		0–100	3	10,000		83	WERL
AS	Full	1B		0–100	5	2,000		97.5	WERL
AS	Full	1B		0–100	4	8,000		85	WERL
AS	Full	238A		0–100	3	2.100		87	WERL
AS	Full	1587E		0–100		0.870		97.8	WERL
AS	Full	234A		0–100		22.000		49	WERL
AS	Full	238A		0–100	3	1.800		87	WERL
AS	Full	1B		0–100	4	1.000		96	WERL
AS	Full	234A		100–1000		3.900		98.7	WERL
AS	Full	1B		0–100	5	9.000		75	WERL
AS	Full	1B		100–1000	5	5.000		98.7	WERL
AS	Full	1B		0–100	3	22,000		45	WERL
AS	Full	1B		0–100	8	28,000		71	WERL
AS	Pilot	241B		100–1000	5	11,000		95.3	WERL
AS	Full	1B		1000–10000	6	440,000		85	WERL
AS	Full	201B		0–100	22	8,000		89.5	WERL
AS	Full	1B		0–100	4	6,000		93	WERL
AS	Full	1B		100–1000	8	48,000		79	WERL
AS	Full	1B		100–1000	6	26,000		78	WERL
AS	Full	234A		0–100		0.600		95.9	WERL
AS	Full	1B		0–100	6	6,000		85	WERL
AS	Full	1B		0–100	5	14,000		74	WERL
AS	Full	1B		100–1000	4	100,000		83	WERL
AS+Fil	Full	6B		10000–100000	3	230,000		99.04	WERL
AS+Fil	Full	6B		100–1000	15	11,000		97.7	WERL
AirS	Pilot	221B		0–100	1	0.500		95.8	WERL
AirS	Pilot	71D		0–100	1	0.200		98.7	WERL
AirS	Full	223B		100–1000	1	0.800		99.43	WERL
AirS	Pilot	222B		0–100	1	0.200		94.3	WERL
AirS	Pilot	217B		100–1000	1	0.300		99.73	WERL
AirS	Pilot	207B		0–100	1	0.500		98.3	WERL
AirS	Full	69A		0–100		0.960		98.4	WERL
AirS	Pilot	220B		0–100	1	0.200		99.76	WERL
AirS	Pilot	206B		0–100	1	0.200		99.17	WERL
AirS	Pilot	1363E		0–100		0.200		97.1	WERL
AirS	Pilot	214B		100–1000	1	0.900		99.31	WERL
AirS	Full	1042E		100–1000		0.500		99.71	WERL
AirS	Full	322B		100–1000	9	1.200		99.75	WERL
AirS	Pilot	1362E		1000–10000	3	5.000		99.74	WERL
AnFF	Bench	724D		10000–100000		4.400		99.99	WERL

TABLE 4-39
WASTEWATER TREATMENT PERFORMANE DATA
FOR TETRACHLOROETHYLENE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	P225		95-31500	18	47.000			BDAT
BT	Full	P280		110-1748	12	10.000			BDAT
BT	Full	REF4		82	1	7.300			BDAT
CAC+AirS	Full	1833D		0-100	7	0.100		88	WERL
ChOx	Pilot	2026A		0-100	4	2.000		86	WERL
ChOx	Pilot	2026A		0-100	4	1.700		84	WERL
Chred	Bench			250	1	5.000			ART
GAC	Full	1264B		0-100		1.000		95.2	WERL
GAC	Full	245B		1000-10000	1	10.000		99.13	WERL
GAC	Full	237A		100-1000	1	10.000		98.3	WERL
PACT	Bench	242E		100-1000		10.000		92.8	WERL
PACT	Bench	Zimpro		304		1.000		99.7	WAO
PACT	Bench	Zimpro		136	1	10.000		93	WAO
RO	Pilot	323B		0-100	1	30.000		68	WERL
RO	Pilot	180A		0-100		0.250		81	WERL
SS	Full	913	10	10800-241000	14	18.400			ITD-L
SS	Full	251B		1000-10000	10	10.000		99.28	WERL
SS	Full	6B		10000-100000	2	10.000		99.95	WERL
TF	Full	1B		0-100	5	12.000		81	WERL
TF	Full	1B		100-1000	5	28.000		83	WERL
TF	Full	1B		0-100	3	18.000		54	WERL
TF	Full	1B		0-100	4	1.000		96.9	WERL
TF	Full	1B		0-100	8	6.000		92.7	WERL
TF	Full	1B		0-100	5	3.000		94.3	WERL
UV (B)	Bench	1136E		0-100	1	7.500		85	WERL
WOx		REF10		41000	1	1000.000			BDAT
WOx	Pilot	780		>1000000		900.000		99.98	WERL

Toluene. For the volatile constituent toluene several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AL+AS, API+DAF+AS, AS, AS+Fil, AirS, AirS+GAC, BT, BT+AC, GAC, PACT, RO, SS, SS+AC, TF, UF, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for toluene is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for toluene is 80 ppb.

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TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR TOLUENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	6B		100–1000	3	10.000		98.2	WERL
AL	Bench	371D		1000–10000		90.000		97	WERL
AL	Full	1B		100–1000	6	32.000		96.1	WERL
AL+AS	Full	233D		1000–10000	21	4.000		99.85	WERL
API+DAF+AS	Full	1482D		10000–100000	4	11.000		99.93	WERL
AS	Bench	202D		10000–100000		10.000		99.98	WERL
AS	Full	6B		10000–100000	3	73.000		99.84	WERL
AS	Full	6B		1000–10000	3	10.000		99.57	WERL
AS	Full	975B		1000–10000		12.000		99.68	WERL
AS	Full	6B		10000–100000	3	76.000		99.90	WERL
AS	Bench	200B		100–1000	10	0.800		99.3	WERL
AS	Full	6B		1000–10000	24	10.000		99.73	WERL
AS	Full	1B		1000–10000	6	9.000		99.81	WERL
AS	Full	6B		1000–10000	15	10.000		99.88	WERL
AS	Full	6B		1000–10000	3	24.000		99.76	WERL
AS	Full	975B		1000–10000		280.000		96.3	WERL
AS	Full	6B		1000–10000	7	10.000		99.5	WERL
AS	Full	975B		100–1000		23.000		88	WERL
AS	Full	6B		1000–10000	33	20.000		98.8	WERL
AS	Pilot	226B		100000–1000000	7	300.000		99.85	WERL
AS	Full	6B		100–1000	14	10.000		97.8	WERL
AS	Full	6B		100–1000	4	10.000		97.6	WERL
AS	Full	1B		0–100	5	4.000		88	WERL
AS	Full	975B		100–1000		7.600		99.04	WERL
AS	Full	1B		100–1000	6	4.000		99.48	WERL
AS	Full	234A		0–100		0.700		97.1	WERL
AS	Full	1B		0–100	4	3.000		90.6	WERL
AS	Full	1587E		0–100		0.100		99	WERL
AS	Full	201B		100–1000	32	57.000		87	WERL
AS	Full	1B		100–1000	5	12.000		96.8	WERL
AS	Full	1B		0–100	4	1.000		98	WERL
AS	Full	234A		0–100		0.200		96.2	WERL
AS	Full	1B		100–1000	4	4.000		96.4	WERL
AS	Full	1B		0–100	5	2.000		97.6	WERL
AS	Full	238A		0–100	3	6.200		92.7	WERL
AS	Full	6B		100–1000	3	10.000		94.4	WERL
AS	Full	1B		0–100	5	2.000		97.1	WERL
AS	Full	1B		0–100	4	4.000		86	WERL
AS	Pilot	241B		100–1000	5	4.000		98.8	WERL

TABLE 4-40
WASTEWATER TREATMENT PERFORMANE DATA
FOR TOLUENE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	234A		0-100		0.200		98.9	WERL
AS	Full	1B		0-100	5	3.000		94	WERL
AS	Full	1B		100-1000	6	20.000		89	WERL
AS	Full	1B		0-100	6	1.000		97.3	WERL
AS	Full	1B		0-100	5	1.000		97.4	WERL
AS	Full	234A		0-100		0.200		97.7	WERL
AS	Full	1B		0-100	6	2.000		98.3	WERL
AS	Full	1B		100-1000	5	58.000		93.8	WERL
AS	Pilot	206B		100-1000	20	0.800		99.78	WERL
AS	Full	1B		100-1000	6	10.000		98.4	WERL
AS	Full	234A		100-1000		0.200		99.9	WERL
AS	Full	1B		100-1000	6	31.000		95.4	WERL
AS	Pilot	REF2		92000	6	23467.000			BDAT
AS+Fil	Full	6B		10000-100000	3	10.000		99.98	WERL
AirS	Full	322B		100-1000	24	0.860		99.77	WERL
AirS	Pilot	1362E		0-100	3	1.700		95.3	WERL
AirS	Bench	1328E		10000-100000	5	2800.000		92.4	WERL
AirS	Full	69A		0-100		0.940		97	WERL
AirS	Full	322B		0-100	5	2.000		97.4	WERL
AirS	Pilot	224B		0-100	1	0.500		98.9	WERL
AirS	Full	322B		1000-10000	6	34.000		99.18	WERL
AirS	Full	322B		10000-100000	3	114.000		99.33	WERL
AirS+GAC	Full	229A		0-100	19	1.000		90	WERL
BT	Full	P206		834-57475	10	1491.000			BDAT
BT	Full	P211		1154-4000	7	10.000			BDAT
BT	Full	P202		80-155	20	10.000			BDAT
BT	Full	P244		1109	1	10.000			BDAT
BT	Full	P210		135-5805	2	10.000			BDAT
BT	Full	P223		99-265	3	10.000			BDAT
BT	Full	P217		34400-60000	3	73.000			BDAT
BT	Full	P234		2350-35000	32	21.000			BDAT
BT	Full	P242		1200-1533	2	10.000			BDAT
BT	Full	P221		10-323	3	10.000			BDAT
BT	Full	P208		140-640	14	10.000			BDAT
BT	Full	P240		22700	1	10.000			BDAT
BT	Full	P246		77-12938	9	630.000			BDAT
BT	Full	P251		15840-26060	3	10.000			BDAT
BT	Full	P253		88-230	3	103.000			BDAT
BT	Full	P257		1730-12900	27	12.000			BDAT
BT	Full	P265		37750-50000	3	10.000			BDAT

TABLE 4-40
WASTEWATER TREATMENT PERFORMANE DATA
FOR TOLUENE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	P288		24000-160000	3	76.000			BDAT
BT	Full	P215		3300-4550	3	10.000			BDAT
BT	Full	P230		3503-30347	15	10.000			BDAT
BT	Full	REF4		660	1	4.000			BDAT
BT+AC	Full	P246		77-12938	10	113.000			BDAT
GAC	Pilot	435B		10000-100000		10.000		99.96	WERL
GAC	Full	245B		10000-100000	1	10.000		99.94	WERL
GAC	Pilot	REF7		120	1	0.300			BDAT
PACT	Bench	200B		100-1000	13	0.300		98.75	WERL
PACT	Bench	242E		0-100		5.000		91.2	WERL
PACT	Bench	Zimpro		2730	1	1.000		99.9	WAO
PACT	Bench	Zimpro		57	1	5.000		91	WAO
RO	Full	250B		100-1000		20.000		92.5	WERL
RO	Pilot	250B		0-100		12.000		88	WERL
RO	Full	250B		1000-10000		420.000		94.7	WERL
SS		0415**	10	19300-29000	3	12.000			ITD-L
SS	Full	6B		1000-10000	2	10.000		99.71	WERL
SS	Full	6B		10000-100000	3	12.000		99.95	WERL
SS		0415*	10	2570-4230	4	22.300			ITD-L
SS	Pilot	REF4		92000	5	42.000			BDAT
SS	Full	P246		57-98	4	10.000			BDAT
SS+AC	Full	P297		640-8650	3	11.000			BDAT
TF	Full	6B		100-1000	3	10.000		96.3	WERL
TF	Full	1B		0-100	5	10.000		88	WERL
TF	Full	1B		0-100	6	7.000		86	WERL
TF	Full	1B		0-100	5	2.000		97.2	WERL
TF	Full	1B		0-100	6	1.000		98.2	WERL
TF	Full	1B		100-1000	4	7.000		97.8	WERL
UF	Pilot	250B		100-1000		84.000		35	WERL
WOx		REF10		8500000	1	200000.000			BDAT
WOx	Bench	Zimpro		4330000	1	12000.000		99.7	WAO
WOx	Bench	Zimpro		5000	1	500.000		90	WAO
WOx	Pilot	Zimpro		30000	1	500.000		98.3	WAO
WOx	Full	Zimpro	50	62000-62000	2	10850.000			WAO
WOx	Full	242E		100-1000		57.000		72	WERL
WOx	Pilot	78D		10000-100000		500.000		98.3	WERL
WOx	Pilot	Zimpro	600	130000-180000	3	3667.000			WAO
WOx (B)	Bench	78D		1000-10000		500.000		90	WERL
WOx (B)	Bench	78D		10000-100000		1000.000		98.8	WERL
WOx (B)	Bench	1054E		10000-100000		500.000		98.9	WERL
WOx (B)	Bench	1054E		>1000000		220000.000		95.7	WERL

Tribromomethane. The data available for the volatile constituent tribromomethane were compiled from the WERL and NPDES databases. Demonstrated treatment technologies included AL, AS, AirS, BT, CAC, CAC+AirS, RO, and TF. The technology size included bench, pilot, and full scale data. The resulting effluent concentrations ranged from 0.01 ppb to 201.0 ppb.

The BDAT standard was set using the RO technology and an achievable effluent of 110 ppb. RO was selected as BDAT since these data represent full-scale substantial treatment by a demonstrated technology with a high influent concentration. The WERL data were preferred over incomplete NPDES data.

The resulting BDAT treatment standard for tribromomethane is 357 ppb as shown in Table 4-173.

TABLE 4-41
WASTEWATER TREATMENT PERFORMANE DATA
FOR TRIBROMOMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		KY0003603			1	5.000			NPDES
		LA0005983			88	0.010			NPDES
		PA0011371			8	1.000			NPDES
		NU0108154			8	1.750			NPDES
		AZ0000108			11	5.455			NPDES
		AZ0000108			11	1.338			NPDES
		AZ0000108			11	4.109			NPDES
		LA0065501			8	8.300			NPDES
		LA0066435			13	4.000			NPDES
		LA00[illegible]214			15	11.788			NPDES
		NJ0028291			2	1.000			NPDES
		NY0165166			4	2.000			NPDES
AL	Pilot	203A		0–100	14	15.000		83	WERL
AL	Pilot	203A		0–100	14	22.000		78	WERL
AS	Full	1B		0–100	1	4.000		90.5	WERL
AS	Pilot	203A		0–100	14	29.000		68	WERL
AS	Pilot	240A		0–100	13	14.000		78	WERL
AirS	Bench	1328E		100–1000	5	79.000		71	WERL
AirS	Pilot	434B		100–1000	4	8.600		98	WERL
AirS	Pilot	434B		1000–10000	4	59.000		97	WERL
AirS	Pilot	369A		0–100		8.800		84	WERL
BT	Full	PA0008419			11	201.000			NPDES
BT	Full	LA0038245			38	5.440			NPDES
CAC	Pilot	203A		100–1000	14	114.000		0	WERL
CAC+AirS	Full	1833D		0–100	5	0.100		75	WERL
RO	Full	250B		10000–100000		110.000		99.8	WERL
TF	Pilot	240A		0–100	13	10.000		83	WERL
TF	Pilot	203A		0–100	14	41.000		54	WERL

1,1,1-Trichloroethane. For the volatile constituent 1,1,1-trichloroethane several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, AirS, BT, GAC, PACT, RO, SS, TF, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for 1,1,1-trichloroethane is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for 1,1,1-trichloroethane is 54 ppb.

TABLE 4-42
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,1,1-TRICHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT [ppb]	RANGE INFLUENT CONCENTRATION [ppb]	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION [ppb]	RECOVERY [%]	REMOVAL [%]	REFERENCE
AL	Full	1B		0-100	5	10,000		90	WERL
AS	Full	201B		0-100	8	21,000		79	WERL
AS	Full	1B		0-100000	4	10,000		89	WERL
AS	Full	234A		1000-10000		1,300		99.88	WERL
AS	Full	1B		1000-10000	8	850,000		87	WERL
AS	Full	1B		0-100	5	9,000		84	WERL
AS	Full	1B		0-100	4	10,000		84	WERL
AS	Full	1B		0-100	5	10,000		81	WERL
AS	Full	1B		100-1000	6	12,000		90	WERL
AS	Full	8B		100-1000	3	10,000		98.9	WERL
AS	Full	375E		0-100	7	1,000		92.3	WERL
AS	Full	1B		0-100	4	12,000		87	WERL
AS	Full	975B		100-1000		4,000		98.1	WERL
AS	Full	234A		0-100		1,000		97.8	WERL
AS	Pilot	206B		100-1000	20	0,300		99.77	WERL
AS	Full	1B		100-1000	5	54,000		89	WERL
AS	Full	1B		100-1000	6	5,000		98.2	WERL
AS	Full	1B		0-100	8	30,000		39	WERL
AS	Full	1B		0-100	4	5,000		95	WERL
AS	Full	1B		100-1000	6	28,000		94.3	WERL
AS	Full	234A		0-100		1,300		78	WERL
AS	Full	238A		0-100	3	2,200		85	WERL
AS	Full	234A		0-100		1,300		73	WERL
AS	Full	1B		0-100	3	2,000		95.8	WERL
AS	Full	238A		0-100	3	2,900		77	WERL
AS	Full	1587E		100-1000		0,270		99.73	WERL
AS	Full	1B		100-1000	5	100,000		70	WERL
AS	Full	375E		0-100	7	1,000		92.3	WERL
AS	Full	1B		0-100	3	7,000		83	WERL
AS	Full	1B		0-100	3	8,000		84	WERL
AS	Full	1B		0-100	3	2,000		95.8	WERL
AS	Pilot	241B		100-1000	5	8,000		97.2	WERL
AS	Full	1B		0-100	5	1,000		98.4	WERL
AS	Full	1B		0-100	3	4,000		88	WERL
AS	Full	234A		0-100		1,300		88	WERL
AS	Bench	2020		100000-1000000		1800,000		98.8	WERL
AS	Pilot	REF6		237	1	23,000			BDAT
AS	Pilot	REF2		150000	6	48883,000			BDAT

TABLE 4-42
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,1,1-TRICHLOROETHANE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AirS	Pilot	211B		0-100	1	1.000		98.8	WERL
AirS	Pilot	207B		0-100	1	0.500		97.5	WERL
AirS	Pilot	812E		1000-10000		49.000		95.9	WERL
AirS	Pilot	222B		100-1000	1	1.100		99.75	WERL
AirS	Pilot	812E		0-100		3.000		92.9	WERL
AirS	Pilot	211B		100-1000	1	1.700		99.5	WERL
AirS	Pilot	1362E		1000-10000	3	130.000		97.8	WERL
AirS	Pilot	812E		100-1000		12.000		89	WERL
AirS	Pilot	217B		0-100	1	0.300		97	WERL
AirS	Pilot	205E		100-1000		7.000		96.8	WERL
AirS	Full	1344E		100-1000		0.200		99.98	WERL
AirS	Pilot	219B		0-100	1	0.500		96.7	WERL
BT	Full	P240		10-215	3	10.000			BDAT
GAC	Bench	1362E		10-100		1.000		99.99	WERL
GAC	Full	1264B		0-100		1.000		96.6	WERL
GAC	Full	1264B		100-1000		1.000		99.35	WERL
GAC	Pilot	812E		100-1000		1.000		99.05	WERL
PACT	Bench	242E		100-1000		25.000		93.8	WERL
PACT	Bench	Zimpro		4970	1	1.000		99.9	WAO
PACT	Bench	Zimpro		405	1	25.000		93.8	WAO
RO	Pilot	180A		0-100		0.050		98.2	WERL
RO	Full	250B		100-1000		36.000		95.6	WERL
RO	Pilot	323B		0-100	1	2.000		97.8	WERL
RO	Full	250B		100-1000		10.000		93.8	WERL
SS	Full	6B		10000-100000		10.000		99.94	WERL
SS	Full	913	10	11900-35000	14	10.000			ITD-L
SS	Pilot	REF2		150000	5	463.000			BDAT
TF	Full	375E		0-100	7	1.000		50	WERL
TF	Full	1B		0-100	5	2.000		92.6	WERL
TF	Full	1B		100-1000	6	2.000		98.3	WERL
TF	Full	1B		0-100	5	5.000		92.2	WERL
UV (B)	Bench	1136E		0-100		30.000		40	WERL
WOx		REF10		370000	1	1000.000			BDAT
WOx	Full	Zimpro	50	6900-9600	2				WAO
WOx	Full	242E		100000-1000000		400.000		99.98	WERL

1,1,2-Trichloroethane. For the volatile constituent 1,1,2-trichloroethane several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, PACT, SS, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for 1,1,2-trichloroethane is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for 1,1,2-trichloroethane is 54 ppb.

TABLE 4-43
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,1,2-TRICHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	3	18,000		97.1	WERL
AS	Pilot	206B		100-1000	20	28,000		79	WERL
AS	Full	6B		0-100	3	10,000		60	WERL
AS	Full	1B		0-100	3	5,000		88	WERL
AS	Pilot	241B		100-1000	5	110,000		54	WERL
PACT	Bench	242E		0-100		5,000		83	WERL
PACT	Bench	190E		1000-10000		4,200		99.68	WERL
PACT	Bench	Zimpro		30	1	5,000		83	WAO
SCOx	Pilot	65D		100000-1000000		36,000		99.98	WERL
SS	Full	913	10	416-26400	14	11,200			ITD-L
SS	Full	415T	10	220-14500	15	10,000			ITD-L
SS	Full	6B		10000-100000	2	10,000		99.96	WERL
SS	Full	6B		1000-10000	8	10,000		99.65	WERL
SS	Full	251B		1000-10000	10	10,000		99.87	WERL
SS	Full	251B		1000-10000	10	5,000		99.91	WERL
WOx	Full	242E		10000-100000		30,000		99.91	WERL

Trichloroethylene. For the volatile constituent trichloroethylene several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases as well as WAO and additional literature data. Demonstrated treatment technologies included Chred, AS, AirS, BT, BT+AC, CAC+Air S, ChOx, GAC, PACT, RO, SS, TF, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for trichloroethylene is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for trichloroethylene is 54 ppb.

TABLE 4-44
WASTEWATER TREATMENT PERFORMANE DATA
FOR TRICHLOROETHYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	202D		10000-100000		210.000		99.78	WERL
AS	Full	1B		0-100	4	5.000		89	WERL
AS	Full	1B		100-1000	8	2.000		99.23	WERL
AS	Full	6B		100-1000	3	10.000		94.1	WERL
AS	Full	1587E		0-100		0.100		95.7	WERL
AS	Full	375E		0-100	7	2.500		58	WERL
AS	Full	1B		0-100	8	1.000		98.7	WERL
AS	Pilot	208B		100-1000	20	1.500		98.8	WERL
AS	Full	238A		0-100	3	2.100		90.8	WERL
AS	Full	1B		100-1000	4	3.000		97.3	WERL
AS	Pilot	241B		100-1000	5	7.000		98.7	WERL
AS	Full	1B		100-1000	8	84.000		87	WERL
AS	Full	234A		0-100		0.700		71	WERL
AS	Full	201B		0-100	8	13.000		87	WERL
AS	Full	1B		0-100	8	2.000		97.8	WERL
AS	Full	1B		0-100	5	1.000		98.5	WERL
AS	Full	8B		0-100	5	10.000		89	WERL
AS	Full	238A		0-100	3	0.500		94.8	WERL
AS	Full	234A		0-100		0.700		92.3	WERL
AS	Full	1B		100-1000	5	31.000		74	WERL
AS	Full	1B		100-1000	8	87.000		87	WERL
AS	Full	1B		0-100	4	4.000		89.7	WERL
AS	Full	1B		100-1000	8	37.000		92.8	WERL
AS	Full	1B		0-100	5	18.000		72	WERL
AirS	Pilot	1382E		1000-10000	3	1.000		99.94	WERL
AirS	Pilot	209B		100-1000	1	0.800		99.58	WERL
AirS	Full	199B		100-1000		1.500		99.75	WERL
AirS	Pilot	28A		100-1000		27.000		87	WERL
AirS	Pilot	218B		100-1000	1	2.100		98.9	WERL
AirS	Pilot	219B		100-1000	1	0.500		99.58	WERL

TABLE 4-44
WASTEWATER TREATMENT PERFORMANE DATA FOR TRICHLOROETHYLENE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AirS	Pilot	389A		0-100		0.300		99.44	WERL
AirS	Pilot	211B		100-1000	1	3.100		98.6	WERL
AirS	Pilot	205E		0-100		1.000		97.2	WERL
AirS	Pilot	220B		100-1000	1	0.200		99.92	WERL
AirS	Pilot	217B		100-1000	1	1.200		99.89	WERL
AirS	Full	322B		100-1000	10	0.480		99.91	WERL
AirS	Pilot	1327E		1000-10000		190.000		91.3	WERL
AirS	Pilot	212B		0-100	1	0.400		99.6	WERL
AirS	Full	223B		0-100	1	0.500		98.2	WERL
AirS	Full	89A		0-100		1.400		98.1	WERL
AirS	Pilot	389A		0-100		3.000		93.2	WERL
AirS	Pilot	221B		0-100	1	0.500		99.44	WERL
AirS	Pilot	1585E		0-100	1	4.300		87	WERL
AirS	Pilot	1363E		100-1000		5.000		97.1	WERL
AirS	Pilot	1327E		0-100		4.300		87	WERL
AirS	Pilot	211B		1000-10000	1	7.700		99.3	WERL
AirS	Full	1042E		0-100		0.300		99.63	WERL
AirS	Pilot	215B		0-100	1	0.500		98	WERL
AirS	Pilot	208B		0-100	1	0.700		99.03	WERL
AirS	Pilot	222B		0-100	1	0.300		99.21	WERL
AirS	Full	322B		1000-10000	7	11.000		99.77	WERL
AirS	Pilot	1585E		1000-10000	1	170.000		84	WERL
AirS	Pilot	71D		100-1000	1	5.000		98.5	WERL
AirS	Pilot	207B		0-100	1	0.500		98.7	WERL
BT	Full	REF4		60	1	5.800			BDAT
BT	Full	P213		18-78	3	10.000			BDAT
BT	Full	P217		98-224	3	10.000			BDAT
BT	Full	P253		484	1	16.000			BDAT
BT+AC	Full	P246		40-70	3	10.000			BDAT
CAC+AirS	Full	1833D		0-100	20	0.200		90	WERL
ChOx	Pilot	2028A		0-100	4	3.700		98.2	WERL

TABLE 4-44
WASTEWATER TREATMENT PERFORMANE DATA
FOR TRICHLOROETHYLENE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
ChOx	Pilot	2026A		100-1000		7.100		94.4	WERL
Chred	Pilot			200	1	5.000			ART
Chred	Bench			280	1	3.900			ART
Chred	Bench			300	1	0.400			ART
GAC	Full	1284B		100-1000		1.000		99.38	WERL
GAC	Full	1284B		0-100		1.000		98.8	WERL
GAC	Full	245B		100-1000	1	10.000		97.8	WERL
GAC	Full	1284B		0-100		1.300		98.8	WERL
GAC	Full	245B		1000-10000	1	10.000		99.48	WERL
GAC	Full	237A		100-1000	1	10.000		95.8	WERL
GAC	Pilot	REF8		171	1	0.590			BDAT
PACT	Bench	242E		0-100		10.000		89	WERL
PACT	Bench	Zimpro		328	1	1.000		99.7	WAO
PACT	Bench	Zimpro		90	1	10.000		89	WAO
PACT	Bench	Zimpro		32.8	1	0.005		99.98	WAO
RO	Full	250B		100-1000		110.000		78	WERL
RO	Full	250B		0-100		5.500		79	WERL
RO	Pilot	323B		0-100	1	88.000		30	WERL
SS	Full	415	10	59-10300	15	16.100			ITD-L
SS	Full	251B		1000-10000	10	5.000		99.91	WERL
SS	Full	6B		1000-10000	14	18.000		99.20	WERL
SS	Full	6B		10000-100000	2	10.000		99.97	WERL
SS	Full	251B		1000-10000	10	10.000		99.79	WERL
SS	Full	913	10	22900-52700	14	10.000			ITD-L
SS	Full	P284		10-10300	15	18.000			BDAT
TF	Full	1B		0-100	6	1.000		98.8	WERL
TF	Full	1B		100-1000	5	1.000		99.33	WERL
TF	Full	1B		0-100	5	1.000		98.5	WERL
TF	Full	1B		0-100	5	1.000		98.4	WERL
TF	Full	1B		0-100	6	5.000		93.2	WERL
UV (B)	Bench	1138E		0-100		22.000		56	WERL
WOx	Bench	Zimpro		500000	1	1700.000		99.7	WAO
WOx	Bench	Zimpro		300000	1	2000.000		99.3	WAO
WOx (B)	Bench	78D		100000-1000000		1700.000		99.66	WERL

Trichloromonofluoromethane. The data available for the volatile constituent trichloromonofluoromethane were compiled from the WERL and NPDES databases and the BDAT database. Demonstrated treatment technologies included AS, AirS+GAC, BT, LL, LL+SS, LL+SS+AC. The technology size includes full-scale data. The resulting effluent concentrations ranged from 1 ppb to 2,400 ppb.

The BDAT standard was set using LL+SS+AC technology and an achievable effluent of 7 ppb. LL+SS+AC was selected as BDAT since this treatment train has the best removal for those data developed for BDAT using BDAT guidelines. In addition, the BDAT data is preferred over WERL and incomplete NPDES data.

The resulting BDAT treatment standard for trichloromonofluoromethane is 23 ppb as shown in Table 4-173.

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TABLE

WASTEWATER TREATMENT PERFORMANE DATA FOR TRICHLOROMONOFLUOROMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppt)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		KY0003603			1	64,000			NPDES
		NY0157112			1	30,000			NPDES
		NY0157112			1	30,000			NPDES
		NJ0028291			2	1,000			NPDES
		NY0002101			8	8,750			NPDES
		NY0199371			19	2,000			NPDES
		NY0002101			8	8,125			NPDES
		LA0065501			6	10,000			NPDES
		AZ0000108			11	1,000			NPDES
		AZ0000108			11	1,009			NPDES
		LA0068435			13	4,848			NPDES
		AZ0000108			11	1,738			NPDES
		NY0005096			1	10,000			NPDES
		NY0005096			15	10,000			NPDES
		NY0007048			9	1,000			NPDES
		NY0177482			42	3,200			NPDES
AS	Full	18		100-1000	1	4.000		97.9	WERL
AirS+GAC	Full	229A		0-100	19	1,000		98.6	WERL
BT	Full	LA0038245			37	16,541			NPDES
BT	Full	REF4		920	1	13,000			BDAT
LL	Full	K104	5	250-20000	5	2400.000			BDAT
LL	Full	K103	5	2500-5000	5	1250.000			BDAT
LL+SS	Full	K103/K104	5	250-20000	5	105.000			BDAT
LL+SS+AC	Full	K103/K104	5	250-20000	4	7.000			BDAT

1,2,3-Trichloropropane. For the volatile constituent 1,2,3-trichloropropane no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 1,2-dichloropropane, Third Third Group IIA2b(3). Using a transfer from this constituent results in a BDAT of AS for 1,2,3-trichloropropane and a calculated BDAT treatment standard of 482 ppb as shown in Table 4-173.

1,1,2-Trichloro-1,2,2-Trifluoroethane. The data available for the volatile constituent 1,1,2-trichloro-1,2,2-trifluoroethane compiled were from the WERL and NPDES databases. The demonstrated treatment technology for the WERL data was WOx. The technology size represented was pilot scale, with the resulting effluent concentrations ranging from 1 ppb to 2,000 ppb.

The BDAT standard was set using the WOx technology and an achievable effluent of 2,000 ppb. WOx was selected as BDAT since this is a demonstrated technology representing substantial treatment. In addition, WERL data were preferred over incomplete NPDES data.

The resulting BDAT treatment standard for 1,1,2-trichloro-1,2,2-trifluoroethane is 6,496 ppb as shown in Table 4-173.

TABLE 4-46
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0005096			14	10,000			NPDES
		NY0003395			3	5,000			NPDES
		NY0005880			6	10,000			NPDES
		NY0005880			1	1,000			NPDES
		NY0005880			17	1,000			NPDES
		NY0005880			9	3,100			NPDES
		NY0107409			2	1,000			NPDES
WOx	Pilot	780		>1000000		2000,000		99.93	WERL

Vinyl Chloride. For the volatile constituent vinyl chloride, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases as well as WAO and additional literature data. Demonstrated treatment technologies included AS, AS+Fil, AirS, and SS, with a technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for vinyl chloride is SS and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for vinyl chloride is 268 ppb.

TABLE 4-47
WASTEWATER TREATMENT PERFORMANE DATA
FOR VINYL CHLORIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	3	50.000		94.9	WERL
AS	Full	1B		1000-10000	6	100.000		94.1	WERL
AS	Full	1B		0-100	4	20.000		80	WERL
AS	Full	1B		10000-100000	6	3900.000		92.9	WERL
AS+Fil	Full	6B		1000-10000	14	50.000		98.3	WERL
AirS	Pilot	217B		0-100	1	0.500		93.1	WERL
AirS	Full	1344E		100-1000		0.100		99.99	WERL
AirS	Full	69A		0-100		0.300		98.4	WERL
SS	Full	251B		1000-10000	10	10.000		99.88	WERL
SS	Full	913	50	50-3500	14	50.000			ITD-L
SS	Full	725	50	410000-2230000	13	37944.200			ITD-L
SS	Full	6B		>1000000	11	120.000		99.99	WERL

1,2-Xylene. The data available for the volatile constituent 1,2-xylene were compiled for the NPDES database, WERL database, and WAO data. Demonstrated treatment included AS, AirS, PACT, RO, and WOx. The technology size included full, pilot, and bench-scale studies. The resulting effluent concentrations ranged from 0.1 ppb to 300 ppb, with a detection limit established at 0.5 ppb (see Table A-1).

The BDAT standard for 1,2-xylene as well as 1,3-xylene and 1,4-xylene were set using the combined data of all three isomers. WOx technology and an achievable effluent of 56 ppb were selected. WOx was the only full-scale data available at the higher concentration ranges, expect RO. The RO study was not able to achieve the low effluent concentrations the WOx technology achieved. Therefore WOx was selected. The 56 ppb effluent concentration is the average of all WOx full-scale studies for 1,2-xylene, 1,3-xylene, 1,4-xylene, and xylene. The resulting BDAT treatment standard for 1,2-xylene is 182 ppb as shown in Table 4-173.

1,3-Xylene. The data available for the volatile constituent 1,3-xylene were compiled from the NPDES database, WERL database, and WAO data. Demonstrated treatment included AS, AirS, PACT, RO, and WOx. The technology size included full, pilot, and bench-scale studies. The resulting effluent concentrations ranged from 0.1 ppb to 300 ppb, with a detection limit established at 0.5 ppb (see Table A-1).

The BDAT standard for 1,2-xylene as well as 1,3-xylene and 1,4-xylene were set using the combined data of all three isomers. WOx technology and an achievable effluent of 56 ppb were selected. WOx was the only full-scale data available at the higher concentration ranges, expect RO. The RO study was not able to achieve the low effluent concentrations the WOx technology achieved. Therefore WOx was selected. The 56 ppb effluent concentration is the average of all WOx full-scale studies for 1,2-xylene, 1,3-xylene, 1,4-xylene, and xylene. The resulting BDAT treatment standard for 1,3-xylene is 182 ppb as shown in Table 4-173.

1,4-Xylene. The data available for the volatile constituent 1,4-xylene were compiled from the NPDES database, WERL database, and WAO data. Demonstrated treatment included AS, AirS, PACT, RO, and WOx. The technology size included full, pilot, and bench-scale studies. The resulting effluent concentrations ranged from 0.1 ppb to 300 ppb, with a detection limit established at 0.5 ppb (see Table A-1).

The BDAT standard for 1,2-xylene as well as 1,3-xylene and 1,4-xylene were set using the combined data of all three isomers. WOx technology and an achievable effluent of 56 ppb were selected. WOx was the only full-scale data available at the higher concentration ranges, expect RO. The RO study was not able to achieve the low effluent concentrations the WOx technology achieved. Therefore WOx was selected. The 56 ppb effluent concentration is the average of all WOx full-scale studies for 1,2-xylene, 1,3-xylene, 1,4-xylene, and xylene. The resulting BDAT treatment standard for 1,4-xylene is 182 ppb as shown in Table 4-173.

TABLE 4-48
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,2-XYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0183828			3	198.330			NPDES
AS	Full	1587E		0-100		0.100		98.8	WERL
AS	Bench	200B		100-1000	15	0.900		99.2	WERL
AirS	Pilot	224B		0-100	1	0.500		93	WERL
PACT	Bench	Zimpro		79	1	5.000		94	WAO
RO	Full	250B		10000-100000		300.000		97.8	WERL
WOx	Full	242E		10000-100000		79.000		99.92	WERL

TABLE 4-49
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,3-XYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0183828			3	193.330			NPDES
AS	Full	1587E		0-100		0.100		98.3	WERL
AirS	Pilot	224B		0-100	1	0.500		72	WERL
GAC	Full	1421D		0-100		0.130		20	WERL
PACT	Bench	242E		0-100		10.000		70	WERL
PACT	Bench	Zimpro		33	1	10.000		70	WAO
WOx	Full	242E		10000-100000		33.000		99.7	WERL

TABLE 4-50
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,4-XYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0183628			3	198.330			NPDES
AirS	Pilot	2248		0-100	1	0.500		90	WERL
GAC	Full	1421D		0-100		0.040		37	WERL

TABLE 4-51
WASTEWATER TREATMENT PERFORMANE DATA
FOR XYLENES

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
GAC	Pilot	REF7		140	1	0.100			BDAT
WOx		REF10		21200	1	500.000			BDAT
WOx	Pilot	Zimpro		8385000	1	20000.000		99.8	WAO

4.2 Semivolatiles

Acenaphthalene. For the semivolatile constituent acenaphthalene, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases as well as WAO and additional literature data. Demonstrated treatment technologies included AL, AS, AS+Fil, and In-PB, with a technology size of full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for acenaphthalene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for acenaphthalene is 59 ppb.

TABLE 4-52
WASTEWATER TREATMENT PERFORMANE DATA
FOR ACENAPHTHALENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	6B		100-1000	3	10.000		98.4	WERL
AS	Full	6B		100-1000	13	10.000		97.9	WERL
AS+Fil	Full	6B		1000-10000	3	13.000		99.87	WERL
In-PB	Full	1293	10	191-699	15	10,000			ITD-L

Acenaphthene. For the semivolatile constituent acenaphthene a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases as well as WAO and additional literature data. Demonstrated treatment technologies included AS, AS+Fil, CAC, In-PB, PACT, TF, and WOx, with a technology size of full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for acenaphthene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for acenaphthene is 59 ppb.

TABLE 4-53
WASTEWATER TREATMENT PERFORMANE DATA
FOR ACENAPHTHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	975B		0–100		4,800		77	WERL
AS	Pilot	204A		0–100	8	1,200		97	WERL
AS	Full	6B		0–100	7	10,000		90	WERL
AS	Full	201B		100–1000	3	1,000		99.44	WERL
AS	Full	6B		100–1000	13	10,000		98.9	WERL
AS+Fil	Full	6B		1000–10000	3	13,000		99.66	WERL
CAC	Pilot	195B		0–100	6	10,000		87	WERL
Fil	Full	792E		0–100	4	2,000		83	WERL
In-PB	Full	1293	10	513–1516	15	10,000			ITD-L
PACT	Bench	975B		0–100		4,000		90	WERL
TF	Full	1B		0–100	4	8,000		88	WERL
WOx	Bench	Zimpro		7000000	1	500,000		99.99	WAO
WOx (B)	Bench	236A		>1000000	1	2800,000		99.98	WERL

Acetophenone. The data available for acetophenone were compiled from the NPDES database. The treatment technology represented by this data is currently unknown due to the incomplete information available from this database. The resulting average effluent concentration was 10,361.56 ppb.

The BDAT standard was set using the incomplete NPDES data and an achievable effluent of 10,361.56 ppb since no other data were available for this constituent.

The resulting BDAT treatment standard for acetophenone is 41,198 ppb as shown in Table 4-173.

TABLE 4-54
WASTEWATER TREATMENT PERFORMANE DATA
FOR ACETOPHENONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NH0001571			32	10361.560			NPDES

2-Acetylaminofluorene. For 2-acetylaminofluorene (U005) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was benz(a)anthracene, Third Third Group IIIA3c. Using a transfer from this constituent results in a BDAT of BT for 2-acetylaminofluorene and a calculated BDAT treatment standard of 40 ppb as shown in Table 4-173.

4-Aminobiphenyl. For 4-aminobiphenyl no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 3,3'-dichlorobenzidine, Third Third Group IIIA2f(1). Using a transfer from this constituent results in a BDAT of AL for 4-aminobiphenyl and a calculated BDAT treatment standard of 95 ppb as shown in Table 4-173.

Aniline. The data available for the semivolatile constituent aniline were compiled from the NPDES database, WERL database, and BDAT database. Demonstrated treatment technologies included AS, LL, LL+SS, and LL+SS+AC. The technology size included both full and pilot-scale. The resulting effluent concentrations ranged from 4.95 ppb to 165,000 ppb.

The BDAT standard was set using LL+SS+AC technology and an achievable effluent of 262 ppb. LL+SS+AC was selected as the best full-scale technology data as developed under BDAT guidelines. In addition, BDAT data is preferred over WERL data.

The resulting BDAT treatment standard for aniline is 807 ppb as shown in Table 4-173.

TABLE 4-55
WASTEWATER TREATMENT PERFORMANE DATA
FOR ANILINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CT0001341			1	10.000			NPDES
		NJ0005291			16	7383.300			NPDES
		SC0000914			12	10.000			NPDES
AS	Pilot	2268		100000-1000000	13	80.000		99.93	WERL
BT	Full	TX0002933			49	22.670			NPDES
CA	Full	NJ0004219			2	4.950			NPDES
LL	Full	K104	30	150000-300000	5	165000.000	91		BDAT
LL	Full	K103	30	33000000-53000000	5	90800.000	91		BDAT
LL+SS	Full	K103/K104	30	150000-53000000	5	2400.000	91		BDAT
LL+SS+AC	Full	K103/K104	30	150000-53000000	4	262.000	91		BDAT

Anthracene. For the semivolatile constituent anthracene, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, AS+Fil, In-PB, and TF, with a technology size of full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for anthracene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for anthracene is 59 ppb.

TABLE 4-56
WASTEWATER TREATMENT PERFORMANE DATA FOR ANTHRACENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	14	10.000		98.6	WERL
AS	Full	1B		0-100	4	13.000		82	WERL
AS	Pilot	204A		0-100	8	0.900		97.4	WERL
AS+Fil	Full	6B		1000-10000	3	10.000		99.52	WERL
Fil	Full	792E		0-100	3	1.000		97.2	WERL
In-PB	Full	1293	10	418-943	15	10.000			ITD-L
TF	Full	1B		100-1000	6	17.000		92.3	WERL

Anthracene. For the semivolatile constituent anthracene, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, AS+Fil, In-PB, and TF, with a technology size of full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for anthracene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for anthracene is 59 ppb.

TABLE 4-56
WASTEWATER TREATMENT PERFORMANE DATA
FOR ANTHRACENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	14	10.000		98.8	WERL
AS	Full	1B		0-100	4	13.000		82	WERL
AS	Pilot	204A		0-100	8	0.900		97.4	WERL
AS+Fil	Full	6B		1000-10000	3	10.000		99.52	WERL
Fil	Full	792E		0-100	3	1.000		97.2	WERL
In-PB	Full	1293	10	418-843	15	10.000			ITD-L
TF	Full	1B		100-1000	6	17.000		92.3	WERL

Aramite. For aramite no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B

The constituent used to transfer treatment performance data was methyl ethyl ketone, Third Third Group IIIA3e. Using a transfer from this constituent results in a BDAT of PACT for aramite and a calculated BDAT treatment standard of 20 ppb as shown in Table 4-173.

Benz(a)anthracene. For the semivolatile constituent benz(a)-anthracene, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, AS+Fil, and In-PB, with technology sizes including pilot and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for benz(a)anthracene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for benz(a)anthracene is 59 ppb.

TABLE 4-57

WASTEWATER TREATMENT PERFORMANE DATA

FOR BENZ(a)ANTHRACENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	2018		0-100	1	1.000		98.3	WERL
AS	Pilot	204A		0-100	8	0.600		97.5	WERL
AS	Full	6B		100-1000	12	10.000		97	WERL
AS+Fil	Full	6B		1000-10000	3	58.000		96.5	WERL
Fil	Full	792E		1000-10000	4	3.000		99.75	WERL
In-PB	Full	1293	10	10-614	15	10.000			ITD-L

Benzal Chloride. For benzal chloride (U017) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B

The constituent used to transfer treatment performance data was chlorobenzene, Third Third Group IIIA. Using a transfer from this constituent results in a BDAT of BT for benzal chloride and a calculated BDAT treatment standard of 40 ppb as shown in Table 4-173.

Benzenethiol. For benzenethiol (P014) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B

The constituent used to transfer treatment performance data was carbon disulfide, Third Third Group IIIA3g. Using a transfer from this constituent results in a calculated BDAT treatment standard of 219 ppb as shown in Table 4-173.

Benzo(a)pyrene. For the semivolatile constituent benzo(a)pyrene, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, CAC, ChOx, GAC, In-PB, and TF, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for benzo(a)pyrene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for benzo(a)pyrene is 61 ppb.

TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR BENZO(a)PYRENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	375E		0-100	7	0.027		86	WERL
AS	Full	375E		0-100	7	0.028		88	WERL
AS	Full	375E		0-100	7	0.018		97.4	WERL
AS	Full	375E		0-100	7	0.021		86	WERL
AS	Full	6B		100-1000	10	10.000		95.2	WERL
CAC	Pilot	195B		1000-10000	8	20.000		98.2	WERL
ChOx(Oz)	Bench	153D		0-100		1.000		78	WERL
Fil	Full	792E		100-1000	4	1.000		99.81	WERL
Fil	Pilot	195D		0-100	8	10.000		50	WERL
GAC	Pilot	195D		1000-10000	8	20.000		98.2	WERL
In-PB	Full	1293	10	10-428	15	10.300			ITD-L
Sed	Bench	153D		0-100		4.200		37	WERL
TF	Full	128E		0-100		0.120		25	WERL
TF	Full	375E		0-100	7	0.016		93.8	WERL
TF	Full	375E		0-100	7	0.035		89	WERL

Benzo(b)fluoranthene. The data available for the semivolatile constituent benzo(b)fluoranthene were compiled from the NPDES database and WERL database. Demonstrated treatment technologies included AS, BT, RO, and TF. The technology size included full and pilot-scale. The resulting effluent concentrations ranged from 0.001 ppb to 10 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 10 ppb. AS was selected based on having full-scale data for AS in the high influent concentration range. Also, the data listed for TF with facility 375E were given an overall poor review rating in the WERL database. As the result AS becomes the recommended technology.

The resulting BDAT treatment standard for Benzo(b)fluoranthene is 40 ppb as shown in Table 4-173.

TABLE 4-59
WASTEWATER TREATMENT PERFORMANE DATA
FOR BENZO(b)FLUORANTHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		MD0000345			1	10.000			NPDES
		NY0000281			1	5.000			NPDES
		NY0000281			9	4.844			NPDES
		IL0001627			9	10.111			NPDES
		MD0000345			1	10.000			NPDES
		KY0003603			1	10.000			NPDES
		KY0003514			1	10.000			NPDES
		WV0004740			1	10.000			NPDES
		LA0065501			6	10.000			NPDES
AS	Full	6B		100-1000	10	10.000		95.4	WERL
AS	Full	375E		0-100	7	0.023		88	WERL
AS	Full	375E		0-100	7	0.014		97.8	WERL
AS	Full	375E		0-100	7	0.023		89.6	WERL
AS	Full	375E		0-100	7	0.017		89	WERL
BT	Full	LA0036245			38	10.126			NPDES
BT	Full	KY0002119			1	10.000			NPDES
RO	Pilot	1634E		0-100		0.001		92.1	WERL
TF	Full	375E		0-100	7	0.033		89.7	WERL
TF	Full	375E		0-100	7	0.017		93.2	WERL

Benzo(ghi)perylene. The data available for the semivolatile constituent benzo(ghi)perylene were compiled from the NPDES database and WERL database. Demonstrated treatment technologies included AS, BT, CAC, chlorination (ChOx(Cl)) and Fil. The technology size included full and pilot-scale. The resulting effluent concentrations ranged from 0.009 ppb to 10.108 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 1 ppb. AS was selected based on the consistency of its performance for the full-scale technologies presented. The effluent concentration of 1 ppb, is the detection limit for benzo(ghi)perylene for EPA approved analytical test procedures, and was used as the limiting effluent concentration.

The resulting BDAT treatment standard for benzo(ghi)perylene is 4 ppb as shown in Table 4-173.

TABLE 4-60
WASTEWATER TREATMENT PERFORMANE DATA
FOR BENZO(ghi)PERYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		LA0065501			8	10.000			NPDES
AS	Full	375E		0–100	7	0.015		96.9	WERL
AS	Full	375E		0–100	7	0.022		85	WERL
AS	Full	1B		0–100	1	3.000		91.4	WERL
AS	Full	375E		0–100	7	0.019		83	WERL
AS	Full	375E		0–100	7	0.021		86	WERL
BT	Full	LA0038245			38	10.108			NPDES
CAC	Pilot	195B		100–1000	8	10.000		96.8	WERL
ChOx(Cl)	Full	1081D		0–100		0.009		73	WERL
Fil	Full	1081D		0–100		0.033		48	WERL
Fil	Full	792E		100–1000	4	2.000		99.29	WERL
TF	Full	375E		0–100	7	0.028		87	WERL
TF	Full	375E		0–100	7	0.016		91.6	WERL

Benzo(k)fluoranthene. For the semivolatile constituent benzo(k)fluoranthene, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, In-PB, RO, and TF, with technology sizes including pilot and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for benzo(k)fluoranthene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for benzo(k)fluoranthene is 59 ppb.

TABLE 4-61
WASTEWATER TREATMENT PERFORMANE DATA
FOR BENZO(k)FLUORANTHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	10	10.000		94.7	WERL
AS	Full	375E		0-100	7	0.012		89	WERL
AS	Full	375E		0-100	7	0.010		96.6	WERL
AS	Full	375E		0-100	7	0.013		89	WERL
In-PB	Full	1293	10	10-352	15	10.000			ITD-L
RO	Pilot	1634E		0-100		0.001		94	WERL
TF	Full	375E		0-100	7	0.015		90.6	WERL
TF	Full	375E		0-100	7	0.014		90	WERL

p-Benzoquinone. For p-benzoquinone (U197) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B

The constituent used to transfer treatment performance data was methyl ethyl ketone, Third Third Group IIIA3e. Using a transfer from this constituent results in a BDAT of PACT for p-benzoquinone and a calculated BDAT treatment standard of 20 ppb as shown in Table 4-173.

Bis(2-chloroethoxy)methane. The data available for the semivolatile constituent bis(2-chloroethoxy)methane were compiled from the NPDES database and WERL database. Demonstrated treatment technologies included full-scale AS and TF studies. The resulting effluent concentrations ranged from 0.001 ppb to 20 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 2 ppb. AS was selected based on the achievable removal rate and effluent concentration in comparison to TF for the data presented.

The resulting BDAT treatment standard for bis(2-chloroethoxy)-methane) is 8 ppb as shown in Table 4-173.

Bis(2-chloroethyl)ether. The data available for the semivolatile constituent bis(2-chloroethyl)ether were compiled from the NPDES database and WERL database. Demonstrated treatment technologies included AL, AS, CAC, ChOx, and TF. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 1 ppb to 430 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 6 ppb. AS was selected based on the technology being the only reported full-scale data. The effluent concentration of 6 ppb was set as the lowest effluent concentration achievable at the highest influent concentrations.

The resulting BDAT treatment standard for bis(2-chloroethyl)ether is 24 ppb as shown in Table 4-173.

The resulting BDAT treatment standard for bis(2-chloroethyl)ether is 24 ppb as shown in Table 4-173.

TABLE 4-62
WASTEWATER TREATMENT PERFORMANE DATA
FOR BIS(2-CHLOROETHOXY)METHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0178152			1	0.001			NPDES
		PA0022047			12	7.750			NPDES
		LA0066214			15	10.000			NPDES
		LA0065501			8	10.000			NPDES
AS	Full	2018		0-100	2	2.000		92.3	WERL
BT	FULL	MID029173			11	3.000			NPDES
BT	Full	NJ0004120			25	9.420			NPDES
BT	Full	LA0038245			38	10.140			NPDES
BT	Full	PA0026247			25	10.310			NPDES
TF	Full	18		0-100	1	20.000		43	WERL

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TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR BIS(2-CHLOROETHYL)ETHER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10,000			NPDES
		PA0012777			38	3,014			NPDES
		NY0107174			8	25,875			NPDES
		MI0000888			8	2,750			NPDES
		LA0068214			15	10,000			NPDES
AL	Pilot	203A		100-1000	11	102,000		29	WERL
AL	Pilot	203A		100-1000	11	78,000		48	WERL
AS	Full	1B		100-1000	11	13,000		98.3	WERL
AS	Pilot	240A		0-100	9	29,000		87	WERL
AS	Full	6B		1000-10000	3	430,000		73	WERL
AS	Pilot	203A		100-1000	11	30,000		79	WERL
AS	Full	975B		1000-10000		6,000		99.87	WERL
BT	Full	KY0002119			13	12,080			NPDES
BT	Full	LA0038245			38	12,492			NPDES
BT	Full	PA0026247			25	10,880			NPDES
BT	Full	PA0026689			2	2,500			NPDES
BT	Full	MI0029173			15	1,000			NPDES
BT	Full	MI0029173			15	1,000			NPDES
CAC	Pilot	203A		100-1000	11	114,000		20	WERL
ChOx	Bench	975B		1000-10000		6,000		99.74	WERL
TF	Pilot	203A		100-1000	11	132,000		8	WERL
TF	Pilot	240A		0-100	9	65,000		32	WERL

Bis(2-chloroisopropyl)ether. The data available for the semivolatile constituent bis(2-chloroisopropyl)ether were compiled from the NPDES database. The demonstrated treatment technology was full-scale BT. The resulting effluent concentrations ranged from 8 ppb to 103,766 ppm with a detection limit for bis(2-chloroisopropyl)ether established at 1 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 10.075 ppb, which represents the average of the BT effluent values after deleting the extremely high value. The value of 103,776 ppb is at least two order of magnitudes higher than all other data. BT was selected based on the full-scale data documented as a proven technology for wastewater. This was the only treatment technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for bis(2-chloroisopropyl)ether is 40 ppb as shown in Table 4-173.

TABLE 4-64
WASTEWATER TREATMENT PERFORMANE DATA
FOR BIS(2-CHLOROISOPROPYL)ETHER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		LA0065501			6	10.000			NPDES
		IL0001627			9	10.000			NPDES
		KY0003514			1	10.000			NPDES
		KY0003603			1	10.000			NPDES
		MD0000345			1	10.000			NPDES
		WV0004740			1	15.000			NPDES
		MI0000540			10	1144.300			NPDES
		PA0022047			11	8.000			NPDES
BT	Full	LA0036245			38	10.150			NPDES
BT	Full	PA0026247			24	10.000			NPDES
BT	Full	KY0002119			13	103766.000			NPDES

Bis(2-ethylhexyl)phthalate. For the semivolatile constituent bis(2-ethylhexyl)phthalate, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, CAC, In-PB, PACT, RO, TF, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for bis(2-ethylhexyl)phthalate is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for bis(2-ethylhexyl)phthalate is 279 ppb.

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TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR BIS(2-ETHYLHEXYL)PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	11	34.000		80	WERL
AL	Full	1B		100-1000	6	73.000		39	WERL
AL	Bench	371D		1000-10000		190.000		90.5	WERL
AL	Pilot	203A		100-1000	11	30.000		82	WERL
AS	Full	1B		0-100	6	8.000		79	WERL
AS	Full	1B		0-100	4	18.000		47	WERL
AS	Full	1B		0-100	4	5.000		81	WERL
AS	Pilot	241B		100-1000	5	7.000		93.7	WERL
AS	Pilot	203A		100-1000	11	18.000		89	WERL
AS	Full	1B		0-100	6	10.000		84	WERL
AS	Bench	202D		100-1000		60.000		77	WERL
AS	Full	1B		0-100	3	10.000		68	WERL
AS	Pilot	241B		1000-10000	4	390.000		64	WERL
AS	Full	1B		100-1000	6	90.000		59	WERL
AS	Full	1B		0-100	6	11.000		64	WERL
AS	Full	1B		100-1000	5	31.000		72	WERL
AS	Full	1B		0-100	5	9.000		67	WERL
AS	Full	1B		0-100	6	20.000		73	WERL
AS	Full	1B		0-100	4	67.000		33	WERL
AS	Full	6B		1000-10000	37	47.000		97.1	WERL
AS	Full	1B		0-100	4	11.000		78	WERL
AS	Full	1B		100-1000	6	40.000		88	WERL
AS	Full	201B		0-100	3	5.000		93.8	WERL
AS	Full	1B		0-100	4	16.000		70	WERL
AS	Pilot	204A		0-100	8	11.000		79	WERL
AS	Pilot	240A		100-1000	10	46.000		73	WERL
AS	Full	1B		100-1000	6	48.000		63	WERL
AS	Full	1B		0-100	6	51.000		39	WERL
AS	Bench	1050E		100-1000	5	35.000		91.2	WERL
AS	Full	1B		0-100	6	10.000		81	WERL
AS	Full	1B		0-100	3	6.000		86	WERL
AS	Full	1B		100-1000	8	190.000		57	WERL
CAC	Pilot	203A		100-1000	11	15.000		91.1	WERL
In-PB	Full	948	10	11-11740	33	43.300			ITD-L
PACT	Bench	975B		100-1000		3.000		99.46	WERL
PACT	Bench	Zimpro		561	1	2.000		99.6	WAO
RO	Full	250B		0-100		8.000		90	WERL
TF	Full	1B		0-100	5	60.000		3	WERL
TF	Pilot	203A		100-1000	11	39.000		77	WERL
TF	Full	1B		0-100	5	5.000		81	WERL
TF	Full	1B		0-100	4	22.000		24	WERL
TF	Full	1B		0-100	6	26.000		32	WERL
TF	Full	1B		0-100	5	33.000		56	WERL
TF	Pilot	240A		100-1000	6	43.000		79	WERL
WOx	Full	Zimpro	2	4800	1	10.000			WAO
WOx	Full	Zimpro	11	1800	1	0.000			WAO
WOx (B)	Bench	1054E		100000-1000000		100.000		99.99	WERL

4-Bromophenyl phenyl ether. The data available for 4-bromophenyl phenyl ether were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The effluent concentrations of all the data documented ranged from 10.0 ppb to 10.05 ppb with a detection limit for 4-bromophenyl phenyl ether established at 1 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 10.05 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for 4-bromophenyl phenyl ether is 40 ppb as shown in Table 4-173.

TABLE 4-66
WASTEWATER TREATMENT PERFORMANE DATA
FOR 4-BROMOPHENYL PHENYL ETHER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		LA0065501			8	10.000			NPDES
BT	Full	LA0038245			38	10.050			NPDES

Butyl Benzyl Phthalate. The data available for the semivolatile constituent butyl benzyl phthalate were compiled from the NPDES database, WERL database, and WAO data. Demonstrated treatment technologies included AS, BT, and PACT. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 1.3 ppb to 138 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 3 ppb. Of the data presented AS was the only technology presented at full-scale. The effluent limit was selected using the data with influent concentrations greater than 100 ppb.

The resulting BDAT treatment standard for butyl benzyl phthalate is 12 ppb as shown in Table 4-173.

2-Sec-Butyl-4,6-Dinitrophenol. The data available for the semivolatile constituent 2-sec-butyl-4,6-dinitrophenol compiled from the WERL database. Demonstrated treatment presented was full-scale WOx, with a resulting effluent concentration of 190 ppb.

Being the only technology with data available, the BDAT standard was set using the WOx technology and an achievable effluent of 190 ppb.

The resulting BDAT treatment standard for 2-sec-butyl-4,6-dinitrophenol is 1,436 ppb as shown in Table 4-173.

TABLE 4-67
WASTEWATER TREATMENT PERFORMANE DATA
FOR BUTYL BENZYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10,000			NPDES
		NY0199848			11	10,730			NPDES
		NY0032140			2	136,500			NPDES
		NY0032140			2	58,000			NPDES
		PA0022047			10	7,000			NPDES
		NY0183828			4	17,500			NPDES
		LA0066214			15	5,000			NPDES
AS	Pilot	204A		0–100	8	1,300		96.2	WERL
AS	Full	1B		0–100	3	5,000		91.6	WERL
AS	Full	1B		0–100	3	2,000		93.8	WERL
AS	Full	1B		100–1000	6	3,000		98.3	WERL
AS	Pilot	241B		0–100	5	9,000		82	WERL
AS	Pilot	241B		100–1000	11	12,000		97	WERL
AS	Full	1B		0–100	6	2,000		96.7	WERL
BT	Full	PA0026247			25	13,795			NPDES
BT	Full	LA0036245			38	10,066			NPDES
PACT	Bench	Zimpro		129	1	2,000		98.4	WAO

TABLE 4-68
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2-SEC-BUTYL-4,6-DINITROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
WOx	Full	78D		10000–100000		190,000		99.5	WERL
WOx	Pilot	Zimpro	3.3	400	1	ND			WAO
WOx	Pilot	Zimpro	17	400	1	ND			WAO
WOx	Pilot	Zimpro	17	400	1	ND			WAO

p-Chloroaniline. The data available for p-chloroaniline were compiled from the WAO treatment test. The demonstrated treatment technology represented was pilot-scale WOx. The resulting effluent concentrations were not detected with the detection limits ranging from 11,000 ppb to 25,000 ppb.

The BDAT standard was set using the WOx technology and an achievable effluent of 11,000 ppb (the lowest detection limit). WOx was selected as BDAT since these data represent substantial treatment by a demonstrated treatment technology.

The resulting BDAT treatment standard for p-chloroaniline is 43,736 ppb as shown in Table 4-173.

TABLE 4-69
WASTEWATER TREATMENT PERFORMANE DATA
FOR p-CHLOROANILINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
WOx	Pilot	Zimpro	12000	46000-59000	1	ND			WAO
WOx	Pilot	Zimpro	11000	46000-59000	1	ND			WAO
WOx	Pilot	Zimpro	25000	46000-59000	1	ND			WAO

Chlorobenzilate. For chlorobenzilate (U038) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was methoxyclor, Third Third Group IIIA2c(3)(d). Using a transfer from this constituent results in a BDAT of WOx for chlorobenzilate and a calculated BDAT treatment standard of 72 ppb as shown in Table 4-173.

p-Chloro-m-cresol. The data available for the semivolatile constituent p-chloro-m-cresol were compiled from the NPDES database and WERL database. Demonstrated treatment technologies were full-scale AS and BT. The resulting effluent concentrations ranged from 0.9 ppb to 11.568 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 4 ppb. AS was selected being the technology with the best data available.

The resulting BDAT treatment standard for p-chloro-m-cresol is 53 ppb as shown in Table 4-173.

2-Chloronaphthalene. The data available for the 2-chloronaphthalene were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The effluent concentrations of all the data documented ranged from 10.0 ppb to 10.05 ppb with a detection limit for 2-chloronaphthalene established at 1 ppb. (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 10.05 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for 2-chloronaphthalene is 40 ppb as shown in Table 4-173.

TABLE

TABLE 4-70
WASTEWATER TREATMENT PERFORMANE DATA
FOR p-CHLORO-m-CRESOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		WI0029971		1.25-7.7	2	7,700			NPDES
		LA0065501			6	10.000			NPDES
		WI0029971		1.25-7.7	2	1.250			NPDES
		NY0002470			3	10.000			NPDES
		WI0029971			2	0.900			NPDES
		LA0066214			15	10.000			NPDES
AS	Full	1B		0-100	1	4.000		87	WERL
BT	Full	LA0038245			37	11,568			NPDES

TABLE 4-71
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2-CHLORONAPHTHALENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		LA0065501			6	10.000			NPDES
BT	Full	LA0038245			38	10.050			NPDES

__2-Chlorophenol__. The data available for the semivolatile constituent 2-chlorophenol were compiled from the WERL database and WAO data. Demonstrated treatment technologies included AL, AS, PACT, rotating biological contactors (RBC), SCOx, and WOx. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 0.05 ppb to 39,000 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 10 ppb. AS was selected being the treatment technology with full-scale data and achieved consistent effluent concentrations.

The resulting BDAT treatment standard for 2-chlorophenol is 51 ppb as shown in Table 4-173.

TABLE 4-72
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2-CHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	1920		100-1000		10.000		95	WERL
AL	Pilot	1920		1000-10000		10.000		99.07	WERL
AS	Full	68		10000-100000	2	10.000		99.93	WERL
AS	Pilot	1920		100-1000		10.000		95	WERL
AS	Full	68		100-1000	3	10.000		97.2	WERL
AS	Pilot	1920		1000-10000		10.000		99.07	WERL
PACT	Bench	Zimpro		31.9	1	0.050		99.84	WAO
PACT	Full	68		10000-100000	10	93.000		99.78	WERL
RBC	Pilot	1920		100-1000		10.000		95	WERL
SCOx	Pilot	850		>1000000		36.000		99.99	WERL
WOx	Bench	Zimpro		12410000	1	15000.000		99.88	WAO
WOx (B)	Bench	236A		>1000000	1	17000.000		99.86	WERL
WOx (B)	Bench	1101D		>1000000		39000.000		99.22	WERL

Chrysene. For the semivolatile constituent chrysene, a few sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, AS+Fil, and In-PB, with technology sizes including pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for chrysene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for chrysene is 59 ppb.

TABLE 4-73
WASTEWATER TREATMENT PERFORMANE DATA
FOR CHRYSENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	204A		0-100	8	1,200		96.9	WERL
AS	Full	6B		100-1000	4	10,000		99	WERL
AS	Full	6B		100-1000	11	10,000		96.8	WERL
AS+Fil	Full	6B		1000-10000	3	10,000		99.09	WERL
Fil	Full	792E		100-1000	4	1,000		99.76	WERL
In-PB	Full	1293	10	10-677	15	10,000			ITD-L

Ortho-Cresol. The data available for the semivolatile constituent ortho-cresol were compiled from the WERL database and the BDAT database. Demonstrated treatment technologies included anaerobic fixed film (Anff) separately and in conjunction with GAC (AnFFwGAC), and BT, and RO technologies. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 14 ppb to 26,000 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 25 ppb. BT was selected being the technology developed for BDAT using BDAT standard procedures. BDAT data is preferred over WERL data.

The resulting BDAT treatment standard for ortho-cresol is 189 ppb as shown in Table 4-173.

TABLE 4-74
WASTEWATER TREATMENT PERFORMANE DATA
FOR ortho-CRESOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AnFF	Bench	230A		100000-1000000		26000.000		78	WERL
AnFF	Pilot	235D		10000-100000		7800.000		85	WERL
AnFFwGAC	Pilot	248D		100000-1000000		8800.000		98.7	WERL
BT	Full	REF5		1886-2538	2	25.000			BDAT
RO	Full	250B		100-1000		14.000		98.5	WERL

Para-Cresol. The data available semivolatile constituent for para-cresol were compiled from the WERL database. Demonstrated treatment technologies included gravity oil water separation followed by dissolved air flotation separation followed by AS (API+DAF+AS), AS, AnFF, RO, and SExt. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 72 ppb to 17,000 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 174 ppb. AS was selected based on its proven track record as a treatment technology, although the data presented pilot-scale results only. Of the two technologies presented as full-scale, API+DAF+AS data is not a single technology and includes AS and AS is a more acceptable technology than RO.

The resulting BDAT treatment standard for para-cresol is 1,315 ppb as shown in Table 4-173.

4-75
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR para-CRESOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
API+DAF+AS	Full	1482D		1000-10000	4	180.000		87	WERL
AS	Pilot	241B		100-1000	9	174.000		68	WERL
AnFF	Bench	230A		100000-1000000		17000.000		90.7	WERL
RO	Full	250B		1000-10000		72.000		97.7	WERL
SExt	Pilot	1082E		100000-1000000		3000.000		99.88	WERL

Cyclohexanone. For the semivolatile constituent cyclohexanone (U057) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was methyl ethyl ketone, Third Third Group IIIA3e. Using a transfer treatment performance data was methyl ethyl ketone, Third Third Group IIIA3e. Using a transfer from this constituent results in a BDAT of PACT for cyclohexanone and a calculated BDAT treatment standard of 20 ppb as shown in Table 4-173.

Dibenz(a,h)anthracene. The data available for the semivolatile constituent dibenz(a,h)anthracene were compiled from the NPDES database and WERL database. Demonstrated treatment was pilot-scale CAC and full-scale BT. The resulting effluent concentration ranged from 10 ppb to 10.066 ppb.

The BDAT standard was set using the CAC technology and an achievable effluent of 10 ppb. CAC was selected because total data (influent, effluent, number of data points, and percent removal) are known. The BT data, although it is full-scale data, has several unknowns. Both technologies indicate that an effluent of 10 ppb is achievable.

The resulting BDAT treatment standard for dibenz(a,h)anthracene is 40 ppb as shown in Table 4-173.

TABLE 4-76
WASTEWATER TREATMENT PERFORMANE DATA
FOR DIBENZ(a,h)ANTHRACENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	LA0068214			15	10.000			NPDES
		LA0065501			6	10.000			NPDES
		LA0038245			38	10.066			NPDES
CAC	Pilot	1958		100-1000	8	10.000		92.8	WERL

Dibenzo(a,e)-pyrene. For the semivolatile constituent dibenzo(a,e)-pyrene no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was benzo(a)pyrene, Third Third Group IIIA3c. Using a transfer from this constituent results in a BDAT of BT for dibenzo(a,e)-pyrene and a calculated BDAT treatment standard of 41 ppb as shown in Table 4-173.

m-Dichlorobenzene. The data available for the semivolatile constituent m-dichlorobenzene were compiled from the WERL database. Demonstrated treatment technologies included aerobic fixed film (AFF), AS, AirS, BGAC, GAC, PACT, and RO. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 0.160 ppb to 3,300 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 3.6 ppb. AS was selected having the best treatment (i.e., lowest effluent concentration) for those full-scale studies with high influent concentrations. AS is one of the most widely acceptable wastewater treatment technology.

The resulting BDAT treatment standard for m-dichlorobenzene is 14 ppb as shown in Table 4-173.

TABLE 4-77
WASTEWATER TREATMENT PERFORMANE DATA
FOR m-DICHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0-100	34	7.100		28	WERL
AS	Full	1587E		0-100		0.270		77	WERL
AS	Full	975B		100-1000		3.600		99.14	WERL
AS	Pilot	241B		100-1000	11	41.000		89	WERL
AS	Full	1B		100-1000	2	5.000		98	WERL
AS	Full	975B		0-100		1.200		93.3	WERL
AS	Bench	202D		10000-100000		340.000		99.51	WERL
AirS	Bench	1328E		10000-100000	5	3300.000		89	WERL
BGAC	Bench	501A		0-100	34	0.500		94.9	WERL
GAC	Full	1421D		0-100		0.290		80	WERL
PACT	Bench	975B		0-100		2.000		83	WERL
PACT	Full	6B		100-1000	10	25.000		96.9	WERL
RO	Pilot	323B		0-100	1	9.000		86	WERL
RO	Pilot	180A		0-100		0.160		69	WERL

o-Dichlorobenzene. The data available for the semivolatile constituent o-dichlorobenzene were compiled from the WERL database, BDAT database, and WAO data. Demonstrated treatment technologies included AFF, AL, AS, AirS, BT, GAC, PACT, RBC, RO, and WOx. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 0.09 ppb to 2,017,000 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 16 ppb. BT was selected based on being BDAT data as developed under BDAT guidelines. This data is substantiated by the full-scale AS data with an average effluent concentration for the higher influent range being 19.14 ppb. Additionally, BDAT data is preferred over WERL data.

The resulting BDAT treatment standard for o-dichlorobenzene is 64 ppb as shown in Table 4-173.

TABLE 4-78

WASTEWATER TREATMENT PERFORMANE DATA FOR o-DICHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0-100	25	0.380		98	WERL
AL	Pilot	1920		100-1000		10.000		97.7	WERL
AL	Pilot	1920		1000-10000		100.000		94.8	WERL
AL	Bench	371D		1000-10000		72.000		97.8	WERL
AS	Full	1B		100-1000	4	8.000		96	WERL
AS	Full	6B		1000-10000	3	52.000		98.5	WERL
AS	Pilot	1920		1000-10000		110.000		94.3	WERL
AS	Pilot	1920		100-1000		270.000		37	WERL
AS	Full	6B		100-1000	330	35.000		98.2	WERL
AS	Full	1B		100-1000	2	5.000		98.2	WERL
AS	Full	1B		0-100	3	2.000		94.3	WERL
AS	Full	6B		1000-10000	4	16.000		99.33	WERL
AS	Bench	200B		100-1000	14	8.000		92.7	WERL
AS	Full	1B		100-1000	5	10.000		91.7	WERL
AS	Full	1587E		0-100		1.200		79	WERL
AS	Bench	202D		10000-100000		50.000		99.94	WERL
AS	Pilot	241B		100-1000	10	25.000		93.2	WERL
AS	Bench	1050E		100-1000	5	1.600		99.8	WERL
AS	Full	375E		0-100	7	5.000		87	WERL
AS	Full	6B		100-1000	3	10.000		92.9	WERL
AS	Bench	1054E		100-1000		8.000		98.4	WERL
AirS	Bench	1328E		10000-100000	5	6200.000		74	WERL
AirS	Pilot	222B		0-100	1	0.500		83	WERL
BGAC	Bench	501A		0-100	34	0.310		96.8	WERL
BT	Full	P246		768-2801	14	598.000			BDAT
BT	Full	P202		1350-4387	4	16.000			BDAT
BT	Full	P206		233-2333	10	88.000			BDAT
BT+AC	Full	P248		768-8275	17	178.000			BDAT
GAC	Full	245B		100-1000	1	10.000		98.9	WERL
GAC	Full	1421D		0-100		0.270		90	WERL
PACT	Bench	242E		0-100		5.000		83	WERL
PACT	Bench	200B		100-1000	14	2.900		97.5	WERL
PACT	Full	6B		1000-10000	10	88.000		98.5	WERL
PACT	Full	6B		100-1000	4	64.000		90	WERL
RBC	Pilot	1920		100-1000		10.000		97.7	WERL
RO	Pilot	323B		0-100	1	11.000		70	WERL
RO	Pilot	180A		0-100		0.090		92.5	WERL
WOx	Bench	Zimpro		590000	1	150000.000		74.6	WAO
WOx	Bench	Zimpro		8530000	1	2017000.000		89.1	WAO
WOx	Pilot	78D		>1000000		29000.000		98.7	WERL

p-Dichlorobenzene. The data available for the semivolatile constituent p-dichlorobenzene were compiled from the WERL database and WAO data. Demonstrated treatment technologies included AFF, AL, AS, AirS, GAC, PACT, RO, and TF. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 0.004 ppb to 3,600 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 16.33 ppb. Based on the data documented, AS had full-scale studies with high influent concentrations, and is a widely accepted treatment technology. The effluent concentrations of 16.33 ppb is an average of data presented for the AS technology in the high influent concentration ranges.

The resulting BDAT treatment standard for p-dichlorobenzene is 88 ppb as shown in Table 4-173.

TABLE 4-79
WASTEWATER TREATMENT PERFORMANE DATA FOR p-DICHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0-100	27	0.200		98.1	WERL
AL	Pilot	192D		0-100		10.000		88	WERL
AL	Pilot	203A		0-100	11	31.000		67	WERL
AL	Pilot	203A		0-100	11	12.000		87	WERL
AL	Pilot	192D		100-1000		10.000		90.5	WERL
AS	Full	1B		0-100	2	10.000		78	WERL
AS	Full	234A		0-100		0.500		81	WERL
AS	Pilot	241B		100-1000	4	10.000		90.7	WERL
AS	Full	975B		1000-10000		12.000		99.63	WERL
AS	Pilot	192D		100-1000		10.000		90.5	WERL
AS	Pilot	631D		0-100		0.004		99	WERL
AS	Pilot	631D		0-100		0.004		99	WERL
AS	Pilot	240A		100-1000	12	8.000		93.8	WERL
AS	Pilot	192D		0-100		10.000		88	WERL
AS	Full	234A		0-100		0.500		90	WERL
AS	Pilot	241B		100-1000	11	19.000		95.1	WERL
AS	Full	201B		0-100	2	6.000		79	WERL
AS	Full	1B		0-100	1	5.000		93.1	WERL
AS	Full	1B		0-100	1	8.000		83	WERL
AS	Pilot	203A		0-100	11	5.000		94.6	WERL
AS	Full	234A		0-100		0.500		91.7	WERL
AS	Full	6B		100-1000	4	10.000		97	WERL
AS	Full	975B		0-100		4.900		92.8	WERL
AS	Full	975B		100-1000		27.000		98.8	WERL
AirS	Bench	1328E		10000-100000	5	3800.000		90	WERL
BGAC	Bench	501A		0-100	34	0.270		97.5	WERL
CAC	Pilot	203A		0-100	11	68.000		29	WERL
ChOx	Bench	975B		0-100		5.000		91.1	WERL
GAC	Full	245B		100-1000	1	10.000		96	WERL
GAC	Full	1421D		0-100		0.200		92	WERL
PACT	Bench	975B		0-100		5.000		93.5	WERL
PACT	Bench	975B		0-100		5.000		92.3	WERL
PACT	Bench	Zimpro		36.8	1	0.015		99.96	WAO
RBC	Pilot	192D		0-100		10.000		88	WERL
RO	Pilot	180A		0-100		0.670		61	WERL
TF	Pilot	240A		100-1000	11	18.000		88	WERL
TF	Pilot	203A		0-100	11	58.000		38	WERL

3,3'-Dichlorobenzidine. The data available for the semivolatile constituent 3,3'-dichlorobenzidine compiled from the NPDES database and the WERL database. Demonstrated treatment technologies included AL and BT both at full-scale treatment. The resulting effluent concentrations ranged from 0.130 ppb to 33,000 ppb.

The BDAT standard was set using AL technology and an achievable effluent of 24 ppb. AL was selected because of the completeness and documentation of the WERL data in comparison to the NPDES data.

The resulting BDAT treatment standard for 3,3'dichlorobenzidine is 95 ppb as shown in Table 4-173.

TABLE 4-80
WASTEWATER TREATMENT PERFORMANE DATA
FOR 3,3'-DICHLOROBENZIDINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MID000781			2	33000.000			NPDES
		LA0065501			8	20.000			NPDES
		PA0026531			28	23250.000			NPDES
		WID025739			1	0.130			NPDES
		LA0068214			15	10.000			NPDES
		NY0083623			7	23.880			NPDES
		CT0001341			33	683.940			NPDES
AL	Full	1B		100-1000	5	24.000		82	WERL
BT	Full	LA0038245			37	16.649			NPDES
BT	Full	PA0026689			2	2.500			NPDES

2,4-Dichlorophenol. The data available for the semivolatile constituent 2,4-dichlorophenol were compiled from the WERL database and WAO data. Demonstrated treatment technologies included AL, AS, GAC, PACT, TF, and WOx. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 0.2 ppb to 3,600 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 10 ppb. AS and 10 ppb were selected based on being the full-scale data with high influent concentration ranges and the lowest achievable effluent concentration.

The resulting BDAT treatment standard for 2,4-dichlorophenol is 76 ppb as shown in Table 4-173.

TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,4-DICHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	11	155,000		32	WERL
AL	Pilot	203A		100-1000	11	65,000		71	WERL
AS	Full	201B		0-100	2	12,000		54	WERL
AS	Full	253B		0-100	1	0,200		98	WERL
AS	Full	253B		0-100	1	2.100		19	WERL
AS	Full	975B		0-100		3,000		83	WERL
AS	Pilot	203A		100-1000	11	1,000		99.58	WERL
AS	Bench	1050E		100-1000	5	0,800		99.8	WERL
AS	Pilot	240A		100-1000	11	12,000		89	WERL
AS	Full	1B		100-1000	4	300,000		52	WERL
AS	Full	6B		100-1000	2	10,000		98.7	WERL
AS	Bench	202D		10000-100000		3600,000		95.2	WERL
AS	Pilot	848D		10000-100000	8	340,000		99.57	WERL
CAC	Pilot	203A		100-1000	11	92,000		80	WERL
GAC	Full	237A		0-100	1	5,000		50	WERL
PACT	Bench	975B		1000-10000		3,000		99.88	WERL
PACT	Full	6B		10000-100000	10	18,000		99.9	WERL
PACT	Pilot	848D		10000-100000	8	10,000		99.99	WERL
TF	Pilot	203A		100-1000	11	200,000		12	WERL
TF	Pilot	240A		0-100	9	36,000		64	WERL
WOx	Bench	Zimpro		23500	1	380,000		98.4	WAO
WOx	Bench	Zimpro		500000	1	2000,000		99.6	WAO
WOx	Pilot	Zimpro	3100	150000-160000	1	ND			WAO
WOx	Pilot	Zimpro	31	150000-160000	1	ND			WAO
WOx	Pilot	Zimpro	6800	150000-160000	1	ND			WAO

2,6-Dichlorophenol. For 2,6-dichlorophenol (U182) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 2,4-dichlorophenol, Third Third Group IIIA2d. Using a transfer from this constituent results in a BDAT of AS for 2,6-dichlorophenol and a calculated BDAT treatment standard of 76 ppb as shown in Table 4-173.

Diethyl phthalate. For the semivolatile constituent diethyl phthalate, several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, In-PB, and PACT, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for diethyl phthalate is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for diethyl phthalate is 203 ppb.

TABLE 4-82
WASTEWATER TREATMENT PERFORMANE DATA
FOR DIETHYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	204A		0-100	8	1,200		97.4	WERL
AS	Full	6B		1000-10000	36	28,000		97.7	WERL
AS	Pilot	241B		100-1000	11	12,000		97.8	WERL
AS	Full	1B		0-100	4	1,000		96.7	WERL
AS	Full	1B		0-100	3	3,000		88	WERL
In-PB	Full	948	10	14-15000	33	23,500			ITD-L
PACT	Bench	Zimpro		88	1	1,000		98.9	WAO

3,3'-Dimethoxybenzidine. For the semivolatile constituent 3,3'dimethoxybenzidine (U091) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 3,3'-dichlorobenzidine, Third Third Group IIIA2f(1). Using a transfer from this constituent results in a BDAT of AL for 3,3'-dimethoxybenzidine and a calculated BDAT treatment standard of 95 ppb as shown in Table 4-173.

p-Dimethylamino azobenzene. For the semivolatile constituent p-dimethylamino azobenzene (U093) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 3,3'-dichlorobenzidine, Third Third Group IIIA3f(3). Using a transfer from this constituent results in a BDAT of AL for p-dimethylamino azobenzene and a calculated BDAT treatment standard of 95 ppb as shown in Table 4-173.

3,3'-Dimethylbenzidine. For 3,3'-dimethylbenzidine (U095) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 3,3'-dichlorobenzidine, Third Third Group IIIA2f(1). Using a transfer from this constituent results in a BDAT of AL for 3,3'-dimethylbenzidine and a calculated BDAT treatment standard of 95 ppb as shown in Table 4-173.

2,4-Dimethylphenol. For the semivolatile constituent 2,4-dimethylphenol several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, AS+Fil, AnFF, anaerobic fixed film with granular activated carbon (AnFFwGAC), In-PB, RO, TF, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for 2,4-dimethylphenol is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for 2,4-dimethylphenol is 36 ppb.

TABLE 4-83
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,4-DIMETHYLPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	192D		1000-10000		10.000		99.81	WERL
AS	Full	6B		100-1000	7	13.000		98.1	WERL
AS	Pilot	192D		1000-10000		10.000		99.81	WERL
AS	Full	6B		10000-100000	14	10.000		99.97	WERL
AS	Pilot	204A		0-100	8	0.900		99.08	WERL
AS+Fil	Full	6B		1000-10000	3	10.000		99.9	WERL
AnFF	Pilot	235D		1000-10000		0.400		99.99	WERL
AnFFwGAC	Pilot	249D		10000-100000		0.050		99.93	WERL
In-PB	Full	1293	10	16216-73537	15	0.000			ITD-L
RBC	Pilot	192D		1000-10000		10.000		99.81	WERL
RO	Full	250B		100-1000		16.000		98.4	WERL
TF	Full	1B		0-100	2	25.000		38	WERL
WOx	Bench	Zimpro		8220000	1	100.000		99.99	WAO
WOx	Pilot	Zimpro	3100	390000-640000	1	ND			WAO
WOx	Pilot	Zimpro	31	390000-640000	1	ND			WAO
WOx	Pilot	Zimpro	6800	390000-640000	1	ND			WAO
WOx (B)	Bench	236A		>1000000	1	820.000		99.99	WERL

Dimethyl phthalate. For the semivolatile constituent dimethyl phthalate several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AS, In-PB, PACT, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for dimethyl phthalate is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for dimethyl phthalate is 47 ppb.

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TABLE

WASTEWATER TREATMENT PERFORMANE DATA FOR DIMETHYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		100-1000	1	2.000		98.2	WERL
AS	Full	6B		100-1000	16	20.000		92.8	WERL
AS	Pilot	241B		100-1000	10	13.000		97.7	WERL
AS	Pilot	204A		0-100	8	0.800		98.3	WERL
AS	Full	1B		0-100	1	30.000		12	WERL
In-PB	Full	948	10	10-625	22	10.000			ITD-L
PACT	Bench	Zimpro		332	1	1.000		99.7	WAO
WOx	Full	Zimpro	1	61000	1	0.000			WAO

Di-n-butyl phthalate. For the semivolatile constituent di-n-butyl phthalate several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, CAC, ChOx, In-PB, and TF, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for di-n-butyl phthalate is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for di-n-butyl phthalate is 57 ppb.

TABLE 4-85
WASTEWATER TREATMENT PERFORMANE DATA
FOR DI-n-BUTYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		100-1000		5,000		99.5	WERL
AL	Pilot	203A		0-100	11	14,000		81	WERL
AL	Pilot	203A		0-100	11	44,000		40	WERL
AS	Pilot	240A		0-100	12	8,000		91.4	WERL
AS	Full	1B		0-100	6	4,000		91.7	WERL
AS	Full	975B		0-100		3,000		87	WERL
AS	Full	1B		0-100	4	5,000		94.4	WERL
AS	Full	201B		0-100	2	3,000		93.5	WERL
AS	Full	1B		0-100	5	5,000		93.8	WERL
AS	Full	1B		0-100	3	10,000		87	WERL
AS	Pilot	204A		0-100	8	2,700		93.9	WERL
AS	Pilot	203A		0-100	11	7,000		90.4	WERL
AS	Full	6B		100-1000	31	13,000		98.8	WERL
AS	Pilot	241B		100-1000	11	17,000		98	WERL
AS	Bench	1050E		100-1000	5	2,400		99.4	WERL
AS	Full	6B		1000-10000	6	30,000		98.7	WERL
CAC	Pilot	203A		0-100	11	47,000		38	WERL
ChOx	Bench	975B		0-100		3,000		87	WERL
In-PB	Full	948	10	19-2000	33	13,000			ITD-L
TF	Full	1B		0-100	5	6,000		92.8	WERL
TF	Full	1B		0-100	3	20,000		70	WERL
TF	Pilot	203A		0-100	11	52,000		29	WERL
TF	Pilot	240A		0-100	11	18,000		81	WERL

1,4-Dinitrobenzene. For 1,4-dinitrobenzene no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 2,4-dinitrotoluene, Third Third Group III3f(5). Using a transfer from this constituent results in a BDAT of PACT for 1,4-dinitrobenzene and a calculated BDAT treatment standard of 231 ppb as shown in Table 4-173.

4,6-Dinitro-o-cresol. For the semivolatile constituent 4,6-dinitro-o-cresol several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included activated carbon (AC), AS, PACT, and WOx, with technology sizes including pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for 4,6-dinitro-o-cresol is AC and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for 4,6-dinitro-o-cresol is 277 ppb.

TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR 4,6-DINITRO-o-CRESOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AC	Full	2680T	24	7822-11400	9	24.000			ITD-L
AS	Pilot	848D		10000-100000	8	20000.000		23	WERL
PACT	Pilot	848D		10000-100000	8	18000.000		39	WERL
PACT	Pilot	848D		10000-100000	8	3000.000		89	WERL
WOx	Pilot	Zimpro	28000	78000	1	ND			WAO
WOx	Pilot	Zimpro	27000	78000	1	ND			WAO
WOx	Pilot	Zimpro	60000	78000	1	ND			WAO
WOx	Pilot	Zimpro	270	78000	1	ND			WAO

2,4-Dinitrophenol. For the semivolatile constituent 2,4-dinitrophenol several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases as well as WAO and additional literature data. Demonstrated treatment technologies included AC, AS, ChOx, Chred, LL, LL+SS, LL+SS+AC, and PACT, with technology sizes including bench and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for 2,4-dinitrophenol is AC and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for 2,4-dinitrophenol is 123 ppb.

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TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,4-DINITROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AC	Full	2880T	50	20000-58155	9	373.000			ITD-L
AS	Full	8B		1000-10000	2	50.000		97.4	WERL
AS	Full	6B		1000-10000	3	50.000		95.4	WERL
AS	Full	6B		1000-10000	4	100.000		97.6	WERL
AS	Bench	2020		10000-100000		660.000		99.31	WERL
AS	Full	975B		1000-10000		4300.000		19	WERL
AS	Full	975B		1000-10000		430.000		84	WERL
ChOx	Bench	975B		1000-10000		42.000		98.7	WERL
ChOx	Bench	975B		100-1000		42.000		88	WERL
Chred	Bench			85-94	4	4.400			ART
LL	Full	K104	150	750000-1500000	5	825000.000			BDAT
LL	Full	K103	150	7500000-15000000	5	420000.000			BDAT
LL+SS	Full	K103/K104	150	750000-15000000	5	42000.000			BDAT
LL+SS+AC	Full	K103/K104	150	750000-15000000	4	297.000			BDAT
PACT	Bench	975B		1000-10000		42.000		98.3	WERL

2,4-Dinitrotoluene. The data available for the semivolatile constituent 2,4-dinitrotoluene were compiled from the WERL database and WAO data. Demonstrated treatment technologies included AS, PACT, and WOx. The technology size included full and bench-scale studies. The resulting effluent concentrations ranged from 58 ppb to 110 ppb.

The BDAT standard was set using PACT technology and an achievable effluent of 58 ppb. PACT was selected based on being the full-scale data with high influent and lowest effluent concentrations. PACT is an acceptable treatment technology used in wastewater treatment.

The resulting BDAT treatment standard for 2,4-dinitrotoluene is 235 ppb as shown in Table 4-173.

TABLE 4-88
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,4-DINITROTOLUENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		10000-100000	3	110.000		99.15	WERL
PACT	Full	6B		1000-10000	4	58.000		98.4	WERL
WOx	Bench	Zimpro		10000000	1	28000.000		99.74	WAO
WOx (B)	Bench	236A		>1000000	1	12000.000		99.88	WERL

2,6-Dinitrotoluene. The data available for the semivolatile constituent 2,6-dinitrotoluene were compiled from the WERL database. Demonstrated treatment technologies included AL, AS, and PACT. The technology size included full, pilot, and bench-scale studies. The resulting effluent concentrations ranged from 18 ppb to 260 ppb.

The BDAT standard was set using PACT technology and an achievable effluent of 100 ppb. PACT was selected based on being the full-scale data with high influent concentrations and lowest effluent concentrations. PACT is an acceptable treatment technology used in wastewater treatment.

The resulting BDAT treatment standard for 2,6-dinitrotoluene is 398 ppb as shown in Table 4-173.

TABLE 4-89
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,6-DINITROTOLUENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		100-1000		27.000		97.3	WERL
AS	Full	6B		1000-10000	3	260.000		92.4	WERL
AS	Pilot	241B		100-1000	10	124.000		70	WERL
AS	Full	1B		0-100	2	18.000		18	WERL
PACT	Full	6B		100-1000	3	100.000		70	WERL

Di-n-octyl phthalate. The data available for the semivolatile constituent di-n-octyl phthalate were compiled from the NPDES database and the WERL database. Demonstrated treatment technologies included Al, AS, BT, ChOx, and PACT. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 3 ppb to 47,000 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 3 ppb. AS was selected based on being the only acceptable treatment technology with full-scale data having an influent concentration greater than 100 ppb.

The resulting BDAT treatment standard for di-n-octyl phthalate is 12 ppb as shown in Table 4-173.

TABLE 4-90
WASTEWATER TREATMENT PERFORMANE DATA
FOR DI-n-OCTYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MA0005304			21	9.810			NPDES
		LA0065501			6	10.000			NPDES
		LA0068214			15	10.000			NPDES
		MS0001970			1	110.000			NPDES
		OH0002445			6	5.717			NPDES
		WI0044636			1	47000.000			NPDES
		NY0004138			5	48.000			NPDES
		OH0002445			1	4.000			NPDES
AL	Bench	3710		1000-10000		48.000		97.6	WERL
AS	Full	1B		0-100	2	12.000		79	WERL
AS	Pilot	204A		0-100	8	4.800		83	WERL
AS	Full	1B		100-1000	1	3.000		98.8	WERL
BT	Full	LA0038245			38	9.981			NPDES
ChOx	Bench	975B		1000-10000		380.000		60	WERL
PACT	Bench	975B		1000-10000		3.000		99.75	WERL

Di-n-propylnitrosamine. For the semivolatile constituent di-n-propylnitrosamine no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was N-nitrosodimethylamine, Third Third Group IIIA3f(6). Using a transfer from this constituent results in a BDAT of AS for di-n-propylnitrosamine and a calculated BDAT treatment standard of 400 ppb as shown in Table 4-173.

Diphenylamine. For the semivolatile constituent diphenylamine no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 2-naphthylamine, Third Third Group IIIA3f(2). Using a transfer from this constituent results in a BDAT of AS for diphenylamine and a calculated BDAT treatment standard of 378 ppb as shown in Table 4-173.

Diphenylnitrosamine. For the semivolatile constituent diphenylnitrosamine (K022) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was N-nitrosodimethylamine, Third Third Group IIIA3f(6). Using a transfer from this constituent results in a BDAT of AS for diphenylnitrosamine and a calculated BDAT treatment standard of 290 ppb as shown in Table 4-173.

1,2-Diphenylhydrazine. The data available for the semivolatile constituent 1,2-diphenylhydrazine were compiled from the WERL and NPDES databases. Demonstrated treatment technologies included AS, BT, and WOx. The technology size included bench and full-scale data. The resulting effluent concentrations ranged from 7.0 ppb to 1,000 ppb.

The BDAT standard was set using the BT/AS technology and an achievable effluent of 15.811 ppb (the average of the BT and AS effluent concentrations). BT/AS was selected as BDAT since it represents a proven technology showing substantial treatment on a full-scale level.

The resulting BDAT treatment standard for 1,2-diphenylhydrazine is 63 ppb as shown in Table 4-173.

TABLE 4-91
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,2-DIPHENYLHYDRAZINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		PA0022047			12	7.000			NPDES
		LA0065501			8	10,000			NPDES
		SC0000814			12	10.000			NPDES
		PA0026379			3	10,000			NPDES
		LA0066214			15	10.000			NPDES
		TX0052591			11	17,300			NPDES
AS	Full	1B		0-100	1	10.000		82	WERL
BT	Full	LA0038245			37	21.822			NPDES
WOx (B)	Bench	236A		>1000000	1	1000.000		99.98	WERL

Fluoranthene. For the semivolatile constituent fluoranthene, a few of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, AS+Fil, CAC, ChOx, In-PB, PACT, RO, and TF, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for fluoranthene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for fluoranthene is 68 ppb.

TABLE 4-92
WASTEWATER TREATMENT PERFORMANE DATA
FOR FLUORANTHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	11	38.000		65	WERL
AL	Pilot	203A		100-1000	11	23.000		78	WERL
AS	Full	375E		0-100	7	0.041		98.1	WERL
AS	Full	375E		0-100	7	0.048		93.3	WERL
AS	Pilot	204A		0-100	8	1.900		93.9	WERL
AS	Full	375E		0-100	7	0.038		94.1	WERL
AS	Full	6B		1000-10000	14	12.000		99.25	WERL
AS	Pilot	240A		0-100	12	8.000		91.8	WERL
AS	Full	375E		0-100	7	0.029		98.8	WERL
AS	Pilot	203A		100-1000	11	5.000		95.2	WERL
AS+Fil	Full	6B		1000-10000	3	16.000		99.89	WERL
CAC	Pilot	195B		1000-10000	8	170.000		93.7	WERL
CAC	Pilot	203A		100-1000	11	13.000		88	WERL
ChOx(Cl)	Full	1081D		0-100		0.045		44	WERL
Fil	Pilot	195B		100-1000	8	110.000		35	WERL
Fil	Pilot	577E		0-100		0.001		99.92	WERL
Fil	Full	1081D		0-100		0.081		42	WERL
Fil	Full	792E		1000-10000	4	3.000		99.56	WERL
In-PB	Full	1293	10	988-2141	15	11.500			ITD-L
PACT	Bench	975B		0-100		3.000		77	WERL
RO	Pilot	1634E		0-100		0.007		88	WERL
TF	Pilot	203A		100-1000	11	49.000		53	WERL
TF	Full	375E		0-100	7	0.029		97.1	WERL
TF	Full	375E		0-100	7	0.044		98.3	WERL
TF	Full	1B		0-100	4	12.000		69	WERL
TF	Pilot	240A		0-100	11	14.000		85	WERL

Fluorene. For the semivolatile constituent fluorene, a few of wastewater treatment performance data were available, including data from the ITD, and WERL databases. Demonstrated treatment technologies included AL, AS, In-PB, and TF with technology sizes including pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for fluorene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for fluorene is 59 ppb.

TABLE 4-93
WASTEWATER TREATMENT PERFORMANE DATA
FOR FLUORENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	6B		100–1000	3	10.000		94.1	WERL
AS	Full	8B		1000–10000	13	10.000		99.17	WERL
AS	Pilot	204A		0–100	8	0.000		98.2	WERL
In-PB	Full	1293	10	678–1873	15	10.000			ITD-L
TF	Full	1B		0–100	4	20.000		54	WERL

Hexachlorobenzene. The data available for the semivolatile constituent hexachlorobenzene were compiled from the WERL database. Demonstrated treatment technologies included AS, AS+Fil, and GAC, all at full-scale. The resulting effluent concentrations ranged from 0.01 ppb to 20 ppb.

The BDAT standard was set using AS+Fil technology and an achievable effluent of 10 ppb. AS+Fil was selected based on being the only full-scale data presented with an influent concentration greater than 100 ppb.

The resulting BDAT treatment standard for hexachlorobenzene is 40 ppb as shown in Table 4-173.

Hexachlorobutadiene. The data available for the semivolatile constituent hexachlorobutadiene were compiled from the WERL database. Demonstrated treatment technologies included AS, AS+Fil, and GAC in both full and pilot-scale studies. The resulting effluent concentrations ranged from 10 ppb to 20 ppb.

The BDAT standard was set using AS+Fil technology and achievable effluent of 10 ppb. AS+Fil was selected based on being full-scale data with influent concentrations greater than 100 ppb and having the best treatment efficiency.

The resulting BDAT treatment standard for hexachlorobutadiene is 40 ppb as shown in Table 4-173.

TABLE 4-94
WASTEWATER TREATMENT PERFORMANE DATA
FOR HEXACHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	375E		0-100	7	0.010		83	WERL
AS	Full	375E		0-100	7	0.010		94.4	WERL
AS+Fil	Full	6B		100-1000	14	10.000		98.7	WERL
GAC	Full	237A		0-100	1	20.000		38	WERL

TABLE 4-95
WASTEWATER TREATMENT PERFORMANE DATA
FOR HEXACHLOROBUTADIENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	241B		100-1000	11	15.000		98.2	WERL
AS+Fil	Full	6B		100-1000	2	10.000		92.8	WERL
AS+Fil	Full	6B		1000-10000	14	10.000		99.6	WERL
GAC	Full	237A		100-1000	1	20.000		82	WERL

Hexachlorocyclopentadiene. The data available for the semivolatile constituent hexachlorocyclopentadiene were compiled from the NPDES database and WAO data. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT and for WERL was bench-scale WOx. The effluent concentrations of all the data documented ranged from 0.2 ppb to 15,000 ppb with a detection limit for hexachlorocyclopentadiene established at 1 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 10.263 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, the only other technology documented was a less proven bench-scale study.

The resulting BDAT treatment standard for hexachlorocyclopentadiene is 41 ppb as shown in Table 4-173.

TABLE 4-96
WASTEWATER TREATMENT PERFORMANE DATA
FOR HEXACHLOROCYCLOPENTADIENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10.000			NPDES
		MI0025739			1	0.200			NPDES
		LA0068214			15	10.000			NPDES
		NY0107174			24	1.000			NPDES
BT	Full	LA0038245			38	10.263			NPDES
WOx	Bench	Zimpro		>10000000	1	15000.000		99.9	WAO

Hexachloroethane. The data available for the semivolatile constituent hexachloroethane were compiled from the WERL database. Demonstrated treatment technologies included AS and AS+Fil in pilot and full-scale respectively. The resulting effluent concentration for both studies was 10 ppb.

The BDAT standard was set using AS+Fil technology and an achievable effluent of 10 ppb. AS+Fil was selected based on being full-scale data in comparison to the pilot-scale AS study.

The resulting BDAT treatment standard for hexachloroethane is 40 ppb as shown in Table 4-173.

Hexachlorophene. For hexachlorophene (U132) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was DDT, Third Third Group IIIA2c(3)(d). Using a transfer from this constituent results in a BDAT of BT for hexachlorophene and a calculated BDAT treatment standard of 1.11 ppb as shown in Table 4-173.

TABLE 4-97
WASTEWATER TREATMENT PERFORMANE DATA
FOR HEXACHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	241B		100-1000	11	10,000		97.1	WERL
AS+Fil	Full	6B		100-1000	14	10,000		93.8	WERL

Hexachloropropylene. For the semivolatile constituent hexachloropropylene (U243) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was cis-1,3-dichloropropylene, Third Third Group IIIA2b(3). Using a transfer from this constituent results in a BDAT of AS for hexachloropropylene and a calculated BDAT treatment standard of 25 ppb as shown in Table 4-173.

Indeno(1,2,3-cd)Pyrene. The data available for the semivolatile constituent indeno(1,2,3-cd)pyrene compiled from the NPDES database and WERL database. Demonstrated treatment technologies included AS, chlorination, Fil and TF all at full-scale. The resulting effluent concentrations ranged from 0.009 ppb to 28 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 1 ppb. AS was selected based on being the most widely accepted treatment technology of those reported. The effluent concentration used for setting the BDAT treatment standard was 1 ppb. This is the detection limit for EPA approved analysis.

The resulting BDAT treatment standard for indeno(1,2,3-cd)pyrene is 4 ppb as shown in Table 4-173.

TABLE 4-98
WASTEWATER TREATMENT PERFORMANE DATA
FOR INDENO(1,2,3-cd)PYRENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10.000			NPDES
		LA0066214			15	28.000			NPDES
AS	Full	375E		0-100	7	0.013		92.8	WERL
AS	Full	375E		0-100	7	0.011		97	WERL
AS	Full	375E		0-100	7	0.017		84	WERL
AS	Full	375E		0-100	7	0.015		86	WERL
BT	Full	LA0038245			38	10.087			NPDES
ChOx(Cl)	Full	1081D		0-100		0.009		67	WERL
Fil	Full	1081D		0-100		0.027		59	WERL
TF	Full	375E		0-100	7	0.012		92.5	WERL
TF	Full	375E		0-100	7	0.019		89	WERL

Isosafrole. For the semivolatile constituent isosafrole (U141) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was phenacetin, Third Third Group IIIA3h. Using a transfer from this constituent results in a BDAT of WOx for isosafrole and a calculated BDAT treatment standard of 9,542 ppb as shown in Table 4-173.

Methapyrilene. For the semivolatile constituent methapyrilene (U155) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was phenacetin, Third Third Group IIIA3h. Using a transfer from this constituent results in a BDAT of WOx for methapyrilene and a calculated BDAT treatment standard of 9,542 ppb as shown in Table 4-173.

3-Methylcholanthrene. For the semivolatile constituent 3-methylcholanthrene no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was indeno(1,2,3-cd)pyrene, Third Third Group IIIA3c. Using a transfer from this constituent results in a BDAT of AS for 3-methylcholanthrene and a calculated BDAT treatment standard of 4 ppb as shown in Table 4-173.

4,4'-Methylenebis(2-chloroaniline). The data available for the semivolatile constituent 4,4'-methylenebis(2-chloroaniline) were compiled from the WERL database. The only demonstrated treatment was a bench-scale AS study with a resulting effluent concentration of 90 ppb.

The BDAT standard was set using the AS technology and achievable effluent of 90 ppb. AS is an acceptable treatment technology for wastewater.

The resulting BDAT treatment standard for 4,4'-methylenebis(2-chloroaniline) is 358 ppb as shown in Table 4-173.

TABLE 4-99
WASTEWATER TREATMENT PERFORMANE DATA
FOR 4,4'-METHYLENEBIS (2-CHLOROANILINE)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	315B		1000-10000	4	80.000		95.7	WERL

Methyl methanesulfonate. For the semivolatile constituent methyl methanesulfonate no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was carbon disulfide, Third Third Group IIIA3g. Using a transfer from this constituent results in a calculated BDAT treatment standard of 219 ppb as shown in Table 4-173.

Naphthalene. For the semivolatile constituent naphthalene, several sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases as well as WAO data. Demonstrated treatment technologies included AL, AS, AirS, CAC, ChOx, In-PB, PACT, RO, TF, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for naphthalene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for naphthalene is 59 ppb.

TABLE 4-100
WASTEWATER TREATMENT PERFORMANE DATA FOR NAPHTHALENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	192D		0-100		10,000		82	WERL
AL	Bench	371D		100-1000		23,000		97.7	WERL
AL	Pilot	192D		100-1000		25,000		98.5	WERL
AL	Pilot	203A		100-1000	11	13,000		88	WERL
AL	Pilot	203A		100-1000	11	38,000		87	WERL
AL+AL	Full	233D		100-1000	21	16,000		98.3	WERL
AS	Full	201B		0-100	11	5,000		89	WERL
AS	Full	6B		100-1000	2	14,000		95.9	WERL
AS	Bench	1050E		100-1000	5	2,000		99.5	WERL
AS	Pilot	241B		100-1000	11	8,900		97.9	WERL
AS	Pilot	241B		100-1000	5	10,000		93	WERL
AS	Full	975B		100-1000		1,000		99.17	WERL
AS	Pilot	204A		0-100	8	0.700		99.09	WERL
AS	Bench	202D		1000-10000		10,000		99.88	WERL
AS	Pilot	203A		100-1000	11	4,000		98.3	WERL
AS	Pilot	240A		100-1000	12	6,000		95	WERL
AS	Full	1B		0-100	5	8,000		86	WERL
AS	Full	1B		100-1000	5	10,000		95.4	WERL
AS	Full	6B		10000-100000	14	10,000		99.95	WERL
AS	Full	6B		100-1000	13	10,000		99	WERL
AS	Pilot	192D		0-100		10,000		82	WERL
AS	Full	1B		0-100	4	3,000		91.9	WERL
AS	Full	6B		1000-10000	7	10,000		99.58	WERL
AS	Full	6B		100-1000	3	10,000		98	WERL
AS	Pilot	192D		100-1000		25,000		98.5	WERL
AirS	Bench	1328E		10000-100000	5	8200,000		74	WERL
CAC	Pilot	203A		100-1000	11	79,000		27	WERL
ChOx	Bench	975B		0-100		2,000		88	WERL
In-PB	Full	1293	10	11227-37145	15	10,000			ITD-L
PACT	Bench	Zimpro		191	1	1,000		99.9	WAO
RBC	Pilot	192D		0-100		10,000		82	WERL
RO	Pilot	180A		0-100		0,020		80	WERL
TF	Pilot	240A		100-1000	11	14,000		88	WERL
TF	Full	1B		0-100	6	3,000		89	WERL
TF	Pilot	203A		100-1000	11	74,000		32	WERL
WOx	Full	Zimpro	6	1200	1	210,000			WAO

__1,4-Naphthoquinone__. For the semivolatile constituent 1,4-naphthoquinone (U166) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was methyl ethyl ketone, Third Third Group IIIA3e. Using a transfer from this constituent results in a BDAT of PACT for 1,4-naphthoquinone and a calculated BDAT treatment standard of 20 ppb as shown in Table 4-173.

__1-Naphthylamine__. For the semivolatile constituent 1-naphthylamine (U167) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 2-naphthylamine, Third Third Group IIIA3f(2). Using a transfer from this constituent results in a BDAT of AS for 1-naphthylamine and a calculated BDAT treatment standard of 378 ppb as shown in Table 4-173.

2-Naphthylamine. The data available for the semivolatile constituent 2-naphthylamine were compiled from the WERL database. The only demonstrated treatment technology was bench-scale AS with a resulting effluent concentration of 95 ppb.

The BDAT standard was set using the AS technology and achievable effluent of 95 ppb. AS is an acceptable treatment technology for wastewater.

The resulting BDAT treatment standard for 2-naphthylamine is 378 ppb as shown in Table 4-173.

TABLE 4-101
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2-NAPHTHYLAMINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	315B		1000-10000	2	95.000		95.4	WERL

p-Nitroaniline. The data available for the semivolatile constituent p-nitroaniline were compiled from the WERL database. The demonstrated treatment technology consisted of a bench-scale PACT study with a resulting effluent concentration of 3 ppb.

The BDAT standard was set using the PACT technology and achievable effluent of 5 ppb. An effluent of 5 ppb was used for setting the BDT standard in lieu of the 3 ppb effluent concentration reported in the data. The 5 ppb is the detection limit for EPA approved analytical methods.

The resulting BDAT treatment standard for p-nitroaniline is 20 ppb as shown in Table 4-173.

TABLE 4-102
WASTEWATER TREATMENT PERFORMANE DATA
FOR p-NITROANILINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
PACT	Bench	190E		10000-100000		3.000		99.98	WERL

Nitrobenzene. For the semivolatile constituent nitrobenzene, several sources of wastewater treatment performance data were available, including data from the ITD, BDAT, and WERL databases as well as WAO data. Demonstrated treatment technologies included AL, AS, AirS, BT, BT+AC, ChOx, LL, LL+SS, LL+SS+AC, PACT, SS, SS+AC, and WOx, with a technology sizes including pilot, bench, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for nitrobenzene is SS+AC and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for nitrobenzene is 68 ppb.

TABLE 4-103
WASTEWATER TREATMENT PERFORMANE DATA FOR NITROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		1000-10000		69.000		97.7	WERL
AS	Full	975B		100-1000		98.000		72	WERL
AS	Full	6B		1000-10000	330	120.000		96.1	WERL
AS	Full	6B		10000-100000	3	150.000		99.8	WERL
AS	Bench	202D		10000-100000		2200.000		97.8	WERL
AS	Bench	200B		100-1000	16	3.000		97.5	WERL
AS	Full	975B		100-1000		3.400		99.48	WERL
AS	Full	6B		1000-10000	28	14.000		99.78	WERL
AS	Pilot	241B		100-1000	4	10.000		92.3	WERL
AS	Full	1B		100-1000	1	23.000		90	WERL
AS	Pilot	241B		100-1000	10	32.000		92.8	WERL
AirS	Bench	1328E		100000-1000000	5	98000.000		16	WERL
BT	Full	P248		821-5559	14	737.000			BDAT
BT+AC	Full	P248		821-90500	18	297.000			BDAT
ChOx	Bench	975B		0-100		2.000		95.9	WERL
LL	Full	K104	30	2200000-3900000	5	2420000.000	115		BDAT
LL	Full	K103	30	1500000-3000000	5	2200000.000	115		BDAT
LL+SS	Full	K103/K104	30	1500000-3900000	5	2400.000	115		BDAT
LL+SS+AC	Full	K103/K104	30	1500000-3800000	4	30.000	115		BDAT
PACT	Bench	190E		100-1000		21.000		98	WERL
PACT	Full	6B		1000-10000	4	14.000		98.8	WERL
PACT	Bench	975B		100-1000		2.000		98.3	WERL
PACT	Bench	200B		100-1000	12	3.700		96.7	WERL
SCOx	Pilot	85D		1000000		22.000		99.99	WERL
SS	Full	P297		87000-330000	10	11793.000			BDAT
SS	Full	P248		91200-1965780	15	251325.000			BDAT
SS+AC	Full	500	14	14-5460000	37	520.300			ITD-L
SS+AC	Full	2880	14	87000-330000	10	712.800			ITD-L
SS+AC	Full	P297		87000-330000	10	713.000			BDAT
WOx	Bench	Zimpro		5125000	1	255000.000		95	WAO

4-Nitrophenol. For the semivolatile constituent 4-nitrophenol several sources of wastewater treatment performance data were available, including data from the ITD, BDAT, and WERL databases as well as WAO data. Demonstrated treatment technologies included AC, AS, LL+SS, PACT, and WOx, with technology sizes including bench and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for 4-nitrophenol is AC and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for 4-nitrophenol is 124 ppb.

TABLE 4-104
WASTEWATER TREATMENT PERFORMANE DATA
FOR 4-NITROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AC	Full	2680T	50	1790-6603	9	50.000			ITD-L
AS	Full	6B		100-1000	3	50.000		93.1	WERL
AS	Full	8B		100-1000	3	140.000		79	WERL
AS	Full	1B		100-1000	2	25.000		95.1	WERL
LL+SS	Full	K103/K104	150	750000-15000000	5	14200.000			BDAT
PACT	Bench	190E		100-1000		3.900		99.46	WERL
PACT	Full	6B		1000-10000	8	50.000		95.8	WERL
WOx	Bench	Zimpro		10000000	1	40000.000		99.8	WAO
WOx (B)	Bench	236A		>1000000	1	4000.000		99.98	WERL
WOx (B)	Bench	1101D		>1000000		10000.000		99.01	WERL

N-Nitrosodi-n-butylamine. For the semivolatile constituent N-nitrosodi-n-butylamine no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was N-nitrosodimethylamine, Third Third Group IIIA3f(6). Using a transfer from this constituent results in a BDAT of AS for N-nitrosodi-n-butylamine and a calculated BDAT treatment standard of 290 ppb as shown in Table 4-173.

N-Nitrosodimethylamine. The data available for the semivolatile constituent N-nitrosodimethylamine were compiled from the NPDES database, WERL database, published articles, and WAO data. Demonstrated treatment technologies included bench-scale AS, chemical reduction (chred) and WOx studies. The resulting effluent concentrations ranged from 0.000 ppb to 22,000 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 73 ppb. AS was selected being the most widely accepted technology documented. All the data presented for n-nitrosodimethyamine were similar in size, influent concentration range and removal efficiency. AS had the lowest reported value for effluent concentration. This in conjunction with its track record made AS the technology of choice for BDAT.

The resulting BDAT treatment standard for N-nitrosodimethylamine is 290 ppb as shown in Table 4-173.

TABLE 4-105
WASTEWATER TREATMENT PERFORMANE DATA
FOR N-NITROSODIMETHYLAMINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10.000			NPDES
		LA0066214			15	10.000			NPDES
		NY0199846			10	11.800			NPDES
AS	Bench	315B		1000-10000	4	73.000		96.7	WERL
BT	Full	LA0038245			37	10.270			NPDES
Chred	Bench			1000	3	0.000			ART
WOx	Bench	Zimpro		510000	1	1000.000		99.8	WAO
WOx	Bench	Zimpro		5030000	1	22000.000		99.6	WAO

__N-Nitrosomethylethylamine__. For the semivolatile constituent N-nitrosomethylethylamine no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was N-nitrosodimethylamine, Third Third Group IIIA3f(6). Using a transfer from this constituent results in a BDAT of AS for N-nitrosoethylmethylamine and a calculated BDAT treatment standard of 290 ppb as shown in Table 4-173.

__N-Nitrosomorpholine__. For the semivolatile constituents N-nitrosoporpholine no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was N-nitrosodimethylamine, Third Third Group IIIA3f(6). Using a transfer from this constituent results in a BDAT of AS for N-nitrosomorpholine and a calculated BDAT treatment standard of 290 ppb as shown in Table 4-173.

N-Nitrosopiperidine. For the semivolatile constituent N-nitrosopiperidine (U179) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was pyridine, Third Third Group IIIA3f(1). Using a transfer from this constituent results in a BDAT of AnFF for N-nitrosopiperidine and a calculated BDAT treatment standard of 10 ppb as shown in Table 4-173.

N-nitrosophyrrolidine. For the semivolatile constituent N-nitrosopyrrolidine (U180) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was pyridine, Third Third Group IIIA3f(1). Using a transfer from this constituent results in a BDAT of AnFF for N-nitrosopyrrolidine and a calculated BDAT treatment standard of 10 ppb as shown in Table 4-173.

5-Nitro-o-toluidine. For the semivolatile constituent 5-nitro-o-toluidine (U181) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 2,4-dinitrotoluene, Third Third Group IIIA3f(5). Using a transfer from this constituent results in a BDAT of PACT for 5-nitro-o-toluidine and a calculated BDAT treatment standard of 230 ppb as shown in Table 4-173.

Pentachlorobenzene. For the semivolatile constituent pentachlorobenzene (U183) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was hexachlorobenzene, Third Third Group IIIA2c(3)(b). Using a transfer from this constituent results in a BDAT of AS+Fil for pentachlorobenzene and a calculated BDAT treatment standard of 40 ppb as shown in Table 4-173.

Pentachloroethane. For the semivolatile constituent pentachloroethane (U184) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was hexachloroethane, Third Third Group IIIA2b(3). Using a transfer from this constituent results in a BDAT of AS+Fil for Pentachloroethane and a calculated BDAT treatment standard of 40 ppb as shown in Table 4-173.

Pentachloronitrobenzene. For the semivolatile constituent pentachloronitrobenzene (U185) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was hexachlorobenzene, Third Third Group IIIA2c(3)(b). Using a transfer from this constituent results in a BDAT of AS+Fil for pentachloronitrobenzene and a calculated BDAT treatment standard of 40 ppb as shown in Table 4-173.

Pentachlorophenol. The data available for the semivolatile constituent pentachlorophenol were compiled from the NPDES database, WERL database, and WAO data. Demonstrated treatment technologies included AL, AS, CAC, Fil, Fil+GAC, GAC, RO, TF, and WOx. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 0.1 ppb to 135,000 ppb.

The BDAT standard was set using Fil+GAC technology and an achievable effluent of 20 ppb. All full-scale data were eliminated for either not having an influent greater than 100 ppb or for high effluent concentration. The Fil+GAC pilot data, was the only data for the correct influent concentration range and having decent treatment efficiency.

The resulting BDAT treatment standard for pentachlorophenol is 82 ppb as shown in Table 4-173.

TABLE 4-106
WASTEWATER TREATMENT PERFORMANE DATA FOR PENTACHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		TX0001201			9	29.400			NPDES
		OH0058874			5	7624.000			NPDES
		MS0044580			1	3.000			NPDES
		TX0001201			59	41.900			NPDES
		MD0103349			14	3.700			NPDES
		MN0048798			40	3.148			NPDES
		NJ0050750			5	18.775			NPDES
		LA0065501			6	5.000			NPDES
		OH0004961			1	16200.000			NPDES
		CT0003751			1	10.000			NPDES
		WI0025739			1	40.000			NPDES
		WY0032590			34	1.000			NPDES
		PA0026631			29	23103.400			NPDES
		WY0032590			1	1.000			NPDES
		CT0001341			24	64.800			NPDES
		NY0001210			1	0.010			NPDES
AL	Pilot	203A		0-100	11	57.000		32	WERL
AL	Pilot	203A		0-100	11	20.000		78	WERL
AL	Pilot	1920		100-1000		10.000		98	WERL
AS	Bench	1050E		100-1000	5	2.800		99.3	WERL
AS	Pilot	1920		100-1000		70.000		86	WERL
AS	Pilot	240A		0-100	9	20.000		60	WERL
AS	Full	6738		1000-10000	29	3800.000		57	WERL
AS	Bench	1681A		100-1000		1.000		99.66	WERL
AS	Bench	2020		1000-10000		170.000		97.9	WERL
AS	Bench	960E		10000-100000	4	5400.000		74	WERL
AS	Full	375E		0-100	7	0.820		15	WERL
AS	Pilot	204A		0-100	8	6.300		17	WERL
AS	Full	375E		0-100	7	0.850		14	WERL

TABLE 4-106
WASTEWATER TREATMENT PERFORMANE DATA
FOR PENTACHLOROPHENOL

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	203A		0-100	11	3.000		98.4	WERL
AS	Bench	1691 A		10000-100000		2.000		99.98	WERL
AS	Full	375E		0-100	7	0.190		63	WERL
AS	Bench	400		10000-100000	30	68.000		99.66	WERL
AS	Bench	1691A		1000-10000		2.000		99.94	WERL
AS	Full	375E		0-100	7	0.410		39	WERL
BT	Full	PA0008800			6	585.200			NPDES
BT	Full	PA0026247			25	28.600			NPDES
BT	Full	LA0038245			41	44.824			NPDES
CAC	Pilot	203A		0-100	11	50.000		40	WERL
COAG+Sed+BT+Fil	Full	MI0024023			18	20.444			NPDES
Fil	Pilot	673B		1000-10000	28	3400.000		8	WERL
Fil+GAC	Pilot	673B		100-1000	9	20.000		95.6	WERL
GAC	Pilot	673B		1000-10000	28	30.000		99.12	WERL
RBC	Pilot	192D		100-1000		90.000		82	WERL
RO	Pilot	180A		0-100		0.100		88	WERL
TF	Pilot	240A		0-100	10	25.000		39	WERL
TF	Full	375E		0-100	7	0.430		8	WERL
TF	Full	1B		100-1000	8	220.000		35	WERL
TF	Full	1B		0-100	8	14.000		69	WERL
TF	Pilot	203A		0-100	11	82.000		2	WERL
TF	Full	375E		0-100	7	0.500		33	WERL
TF	Full	MD0023264			10	12.100			NPDES
WOx	Bench	Zimpro		5000000	1	135000.000		97.3	WAO
WOx (B)	Bench	236A		>1000000	1	6000.000		99.88	WERL

Phenacetin. The data available for the semivolatile constituent phenacetin were compiled from the WAO treatment test. The demonstrated treatment technology was WOx. The technology size represented was pilot scale. The resulting effluent concentrations were all not detected and had detection limits of 2,400 ppb and 5,300 ppb.

The BDAT standard was set using WOx technology and an achievable effluent of 2,400 ppb (the lower of the two detection limits). WOx was selected as BDAT since this is a demonstrated technology which provides substantial treatment for the constituent of concern.

The resulting BDAT treatment standard for phenacetin is 9,542 ppb as shown in Table 4-173.

TABLE 4-107
WASTEWATER TREATMENT PERFORMANE DATA
FOR PHENACETIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
WOx	Pilot	Zimpro	2400	120000-130000	1	ND			WAO
WOx	Pilot	Zimpro	5300	120000-130000	1	ND			WAO
WOx	Pilot	Zimpro	2400	120000-130000	1	ND			WAO

Phenanthrene. For the semivolatile constituent phenanthrene, a few sources of wastewater treatment performance data were available, including data from the ITD and WERL databases. Demonstrated treatment technologies included AL, AS, AS+Fil, CAC, In-PB, PACT, and TF, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for phenanthrene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for phenanthrene is 59 ppb.

TABLE 4-108
WASTEWATER TREATMENT PERFORMANE DATA
FOR PHENANTHRENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	6B		100-1000	5	10,000		92.9	WERL
AL	Pilot	203A		0-100	11	40,000		58	WERL
AL	Pilot	203A		0-100	11	16,000		83	WERL
AL	Bench	371D		100-1000		15,000		98.5	WERL
AS	Pilot	204A		0-100	8	1,100		97.2	WERL
AS	Pilot	240A		0-100	12	6,000		93	WERL
AS	Full	8B		1000-10000	14	10,000		99.7	WERL
AS	Pilot	203A		0-100	11	4,000		95.8	WERL
AS	Full	1B		0-100	4	13,000		82	WERL
AS	Bench	202D		100-1000		10,000		98.2	WERL
AS	Bench	1050E		100-1000	5	2,000		99.5	WERL
AS+Fil	Full	6B		1000-10000	3	17,000		99.8	WERL
CAC	Pilot	203A		0-100	11	24,000		75	WERL
Fil	Full	792E		0-100	4	10,000		85	WERL
In-PB	Full	1293	10	2035-4711	15	10,000			ITD-L
PACT	Full	8B		100-1000	10	25,000		95.8	WERL
TF	Pilot	240A		0-100	10	9,000		90	WERL
TF	Pilot	203A		0-100	11	51,000		46	WERL
TF	Full	1B		100-1000	8	17,000		91.5	WERL

Phenol. For the semivolatile constituent phenol, several sources of wastewater treatment performance data were available, including data from the ITD, BDAT, and WERL databases as well as WAO data. Demonstrated treatment technologies included AL, API+DAF+AS, AS, ChOx, GAC, In-PB, LL, LL+SS, LL+SS+AC, PACT, RO, SS, TF, WOx, AS+Fil, and Anff, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for phenol is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for phenol is 26 ppb.

TABLE 4-109
WASTEWATER TREATMENT PERFORMANE DATA
FOR PHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	11	84.000		33	WERL
AL	Pilot	203A		100-1000	11	18.000		86	WERL
AL	Full	6B		100-1000	3	11.000		90.8	WERL
AL	Pilot	192D		100-1000		10.000		98.99	WERL
API+DAF+AS	Full	1482D		100-1000	4	85.000		89.5	WERL
AS	Full	1B		100-1000	5	2.000		98.6	WERL
AS	Full	1B		0-100	6	26.000		83	WERL
AS	Bench	202D		100000-1000000		0.010		99.99	WERL
AS	Full	6B		100-1000	38	10.000		96.4	WERL
AS	Full	1B		100-1000	5	8.000		97.2	WERL
AS	Pilot	203A		100-1000	11	14.000		89	WERL
AS	Full	201B		100-1000	31	20.000		92.6	WERL
AS	Full	1B		100-1000	6	1.000		99.88	WERL
AS	Full	6B		10000-100000	3	10.000		99.94	WERL
AS	Full	1B		100-1000	6	61.000		92.4	WERL
AS	Full	1B		0-100	3	1.000		96.4	WERL
AS	Full	975B		1000-10000		3.800		99.87	WERL
AS	Full	1B		100-1000	5	1.000		99.33	WERL
AS	Bench	1054E		100000-1000000		0.250		99.88	WERL
AS	Pilot	240A		0-100	11	10.000		90	WERL
AS	Full	6B		100-1000	7	15.000		98	WERL
AS	Full	1122E		10000-100000		4000.000		95.2	WERL
AS	Full	6B		100-1000	3	120.000		97.9	WERL
AS	Pilot	241B		100-1000	4	8.000		97.2	WERL
AS	Full	6B		1000-10000	10	21.000		99.64	WERL
AS	Full	975B		100-1000		20.000		87	WERL
AS	Full	6B		100-1000	11	10.000		96.3	WERL
AS	Full	1B		100-1000	6	1.000		99.44	WERL
AS	Full	1B		0-100	6	1.000		98.3	WERL
AS	Full	6B		100-1000	3	10.000		98.6	WERL
AS	Pilot	226B		100000-1000000	6	500.000		99.95	WERL
AS	Full	975B		1000-10000		160.000		95	WERL
AS	Full	6B		100000-1000000	2	10.000		99.99	WERL
AS	Pilot	204A		100-1000	8	14.000		94.6	WERL
AS	Pilot	192D		100-1000		10.000		98.99	WERL
AS	Full	6B		1000-10000	4	56.000		96.9	WERL
AS	Bench	1054E		10000-100000		1000.000		95	WERL
AS	Full	6B		100000-1000000	13	10.000		99.99	WERL
AS	Full	1B		100-1000	6	25.000		94.4	WERL
AS+Fil	Full	6B		10000-100000	3	13.000		99.98	WERL
AS+Fil	Full	6B		100-1000	15	10.000		98	WERL

TABLE 4-109
WASTEWATER TREATMENT PERFORMANE DATA
FOR PHENOL

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AnFF	Pilot	231A		1000000		700,000		99.98	WERL
AnFF	Pilot	231A		1000000		30,000		99.99	WERL
AnFF	Bench	230A		100000-1000000		10,000		98.97	WERL
AnFF	Pilot	231A		100000-1000000		10,000		99.99	WERL
AnFF	Pilot	231A		100000-1000000		70,000		99.98	WERL
AnFF	Bench	230A		>1000000		1000,000		99.95	WERL
AnFF	Pilot	235D		100000-1000000		240,000		99.86	WERL
AnFFwGAC	Pilot	249D		1000000		50,000		99.99	WERL
CAC	Pilot	203A		100-1000	11	99,000		21	WERL
ChOx	Bench	975B		100-1000		16,000		93.3	WERL
ChOx	Bench	975B		100-1000		2,000		98.3	WERL
ChOx	Bench	975B		1000-10000		12,000		99.37	WERL
GAC	Bench	1054E		100-1000		10,000		99	WERL
GAC	Full	245B		100-1000	1	10,000		92.6	WERL
GAC	Full	237A		1000-10000	1	5,000		99.89	WERL
In-PS	Full	1293	10	698584-978672	15	10,000			ITD-L
LL	Full	K104	30	150000-600000	5	165000,000	21		BDAT
LL	Full	K103	30	1500000-3000000	5	84000,000	21		BDAT
LL+SS	Full	K103/K104	30	150000-6000000	5	2400,000	21		BDAT
LL+SS+AC	Full	K103/K104	30	150000-3000000	4	60,000	21		BDAT
PACT	Bench	190E		10000-100000		1,900		99.99	WERL
PACT	Bench	975B		1000-10000		2,000		99.98	WERL
PACT	Full	6B		1000-10000	3	30,000		98.6	WERL
PACT	Bench	975B		1000-10000		9,000		99.85	WERL
RBC	Pilot	603E		100000-1000000		1700,000		99.8	WERL
RBC	Pilot	192D		100-1000		10,000		98.99	WERL
RO	Full	250B		1000-10000		120,000		93.6	WERL
SBR	Pilot	1433D		10000-100000	16	1000,000		97.7	WERL
SBR	Pilot	227D		100000-1000000	1	1000,000		99.91	WERL
SBR	Bench	64D		100000-1000000		3000,000		99.83	WERL
SBRwPACT	Bench	64D		100000-1000000		1000,000		99.88	WERL
SExt	Pilot	1062E		>1000000		210000,000		95.4	WERL
SS	Pilot	1062E		100000-1000000		160,000		24	WERL
TF	Pilot	203A		100-1000	11	64,000		49	WERL
TF	Full	1B		100-1000	8	47,000		62	WERL
TF	Pilot	240A		0-100	10	6,000		91.3	WERL
TF	Full	1B		0-100	6	1,000		98.2	WERL
WOx	Bench	Zimpro		10000000	1	20000,000		99.8	WAO
WOx (B)	Bench	1054E		100000-1000000		27000,000		97.3	WERL
WOx (B)	Bench	1101D		>1000000		3600,000		99.92	WERL
WOx (B)	Bench	236A		>1000000	1	3000,000		99.97	WERL

Phthalic Anhydride. For semivolatile constituent phthalic anhydride (U190) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was methyl ethyl ketone, Third Third Group IIIA3e. Using a transfer from this constituent results in a BDAT of PACT for phthalic anhydride and a calculated BDAT treatment standard of 20 ppb as shown in Table 4-173.

Pronamide. The data available for the semivolatile constituent pronamide were compiled from the WAO treatment test. The demonstrated treatment technology represented is pilot scale WOx. The resulting effluent concentrations were all not detected with the detection limits ranging from 21 ppb to 4,500 ppb.

The BDAT standard was set using the WOx technology and an achievable effluent of 21 ppb (the lowest detection limit). WOx was selected as BDAT since these data represent substantial treatment by a demonstrated treatment technology.

The resulting BDAT treatment standard for pronamide is 83 ppb as shown in Table 4-173.

TABLE 4-110
WASTEWATER TREATMENT PERFORMANE DATA
FOR PRONAMIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
WOx	Pilot	Zimpro	2000	91000-98000	1	ND			WAO
WOx	Pilot	Zimpro	2100	91000-98000	1	ND			WAO
WOx	Pilot	Zimpro	21	91000-98000	1	ND			WAO
WOx	Pilot	Zimpro	4500	91000-98000	1	ND			WAO

Pyrene. For the semivolatile constituent pyrene, several sources of wastewater treatment performance data were available, including data from the ITD and WERL databases as well as WAO data. Demonstrated treatment technologies included AL, AS+Fil, CAC, ChOx, GAC, In-PB, TF, and WOx, with technology sizes including bench, pilot, and full-scale.

The treatment performance data available from the ITD database were used as BDAT for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in that database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD unit represents data that have undergone both EPA and industry review and acceptance.

The BDAT for pyrene is BT and using the ITD median long term average and ITD Option 1 variability factor, a BDAT treatment standard equal to the ITD limit was calculated as shown in Table 4-173. The BDAT treatment standard for pyrene is 67 ppb.

TABLE 4-111
WASTEWATER TREATMENT PERFORMANE DATA
FOR PYRENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		100-1000	11	15,000		97	WERL
AL	Pilot	203A		100-1000	11	38,000		65	WERL
AL	Pilot	203A		100-1000	11	25,000		76	WERL
AS	Pilot	203A		100-1000	11	5,000		95.2	WERL
AS	Full	1B		0-100	1	5,000		80	WERL
AS	Pilot	204A		0-100	8	2,000		93.3	WERL
AS	Pilot	240A		0-100	12	10,000		90	WERL
AS	Full	6B		100-1000	14	10,000		99	WERL
AS+Fil	Full	6B		1000-10000	3	18,000		99.48	WERL
CAC	Pilot	195B		1000-10000	8	110,000		94.5	WERL
CAC	Pilot	203A		100-1000	11	12,000		88	WERL
ChOx(Cl)	Full	1081D		0-100		0.018		60	WERL
Fil	Pilot	195B		100-1000	8	80,000		27	WERL
Fil	Pilot	577E		0-100		0.001		99.98	WERL
Fil	Full	1081D		0-100		0.045		40	WERL
Fil	Full	792E		1000-10000	4	8,000		98.5	WERL
GAC	Pilot	195D		0-100	8	10,000		79	WERL
In-PB	Full	1293	10	641-1438	15	10,300			ITD-L
TF	Pilot	203A		100-1000	11	48,000		54	WERL
TF	Pilot	240A		0-100	10	17,000		83	WERL
WOx	Bench	Zimpro		500000	1	280,000		99.95	WAO

Resorcinol. The data available for the semivolatile constituent resorcinol were compiled from the WERL database. Demonstrated treatment consisted of Anff in both pilot and bench-scale studies. The resulting effluent concentrations ranged from 5.5 ppb to 5,000 ppb.

The BDAT standard was set using AnFF technology and an achievable effluent of 5.5 ppb. The AnFF technology was selected based on being the only data available. AnFF is a relatively new technology for treating wastewater, but has several full-scale systems in operations.

The resulting BDAT treatment standard for resorcinol is 42 ppb as shown in Table 4-173.

TABLE 4-112

WASTEWATER TREATMENT PERFORMANE DATA

FOR RESORCINOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AnFF	Bench	230A		100000-1000000		5000.000		99.44	WERL
AnFF	Pilot	235D		10000-100000		5.500		99.99	WERL

Safrole. For the semivolatile constituent safrole (U203) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was phenacetin, Third Third Group IIIA3h. Using a transfer from this constituent results in a BDAT of WOx for safrole and a calculated BDAT treatment standard of 9,542 ppb as shown in Table 4-173.

1,2,4,5-Tetrachlorobenzene. For the semivolatile constituent 1,2,4,5-tetrachlorobenzene (U207) incomplete NPDES data for only facility were available. Since the NPDES average effluent value was below the compound detection limit of 1.5 ppb it is not likely that this data represents treatment. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was hexachlorobenzene, Third Third Group IIIA2c(3)(b). Using a transfer from this constituent results in a BDAT of AS+Fil for 1,2,4,5-tetrachlorobenzene and a calculated BDAT treatment standard of 40 ppb as shown in Table 4-173.

TABLE 4-113
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,2,4,5-TETRACHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MI0000888			9	1.111			NPDES

2,3,4,6-Tetrachlorophenol. The data available for the semivolatile constituent 2,3,4,6-tetrachlorophenol were compiled from the WERL database. Demonstrated treatment technologies included full-scale AS and TF. The resulting effluent concentrations ranged from 0.06 ppb to 0.21 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 6.8 ppb. Both AS and TF are biological processes. None of the data presented for either technology included high influent concentration ranges or high removal efficiencies. Since effluent concentrations for both technologies were so similar, the general treatment technology BT was selected. The BDAT standard was set using the detection limit of 6.8 ppb in lieu of the actual data. However, the actual data presented substantiates that this level of treatment is achievable.

The resulting BDAT treatment standard for 2,3,4,6-tetrachlorophenol is 51 ppb as shown in Table 4-173.

TABLE 4-114
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,3,4,6-TETRACHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	375E		0-100	7	0.080		82	WERL
AS	Full	375E		0-100	7	0.210		18	WERL
AS	Full	375E		0-100	7	0.180		5	WERL
AS	Full	375E		0-100	7	0.110		15	WERL
TF	Full	375E		0-100	7	0.100		28	WERL
TF	Full	375E		0-100	7	0.080		45	WERL

1,2,4-Tricholorobenzene. The data available for the semivolatile constituent 1,2,4-trichlorobenzene were compiled from the WERL database. Demonstrated treatment technologies included AFF, AS, GAC, PACT, RO, and TF. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 0.02 ppb to 89 ppb.

The BDAT standard was set using PACT technology and an achievable effluent of 10 ppb. PACT was selected based on being a proven technology for wastewater treatment. OF all the full-scale data presented with influent concentrations greater than 100 ppb, PACT, and GAC were both equal (10 ppb) in effluent concentrations. However, PACT had consistently better removal efficiencies (96 and 98%).

The resulting BDAT treatment standard for 1,2,4-tricholorobenzene is 46 ppb as shown in Table 4-173.

TABLE 4-115
WASTEWATER TREATMENT PERFORMANE DATA
FOR 1,2,4-TRICHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0-100	23	0.870		90.5	WERL
AS	Full	6B		100-1000	330	71.000		88	WERL
AS	Pilot	241B		100-1000	9	89.000		86	WERL
AS	Full	1B		0-100	6	8.000		92	WERL
AS	Full	201B		0-100	13	14.000		80	WERL
AS	Full	1B		1000-10000	4	89.000		91.9	WERL
AS	Full	975B		100-1000		36.000		84	WERL
AS	Bench	200B		100-1000	14	12.000		90	WERL
BGAC	Bench	501A		0-100	34	0.280		96.9	WERL
GAC	Full	245B		1000-10000	1	10.000		99.74	WERL
GAC	Full	1421D		0-100		0.830		90	WERL
PACT	Bench	200B		100-1000	12	2.100		98	WERL
PACT	Full	6B		100-1000	10	10.000		96	WERL
RO	Pilot	180A		0-100		0.020		95.7	WERL
TF	Full	1B		0-100	3	5.000		91.7	WERL

2,4,5-Trichlorophenol. For the semivolatile constituent 2,4,5-trichlorophenol (U230) incomplete NPDES data for only one facility were available. Since grease and oil removal does not represent a demonstrated organic treatment technology, these data were not used in evaluating BDAT. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 2,4,6-trichlorophenol. Using a transfer from this constituent results in a BDAT of AS for 2,4,5-trichlorophenol and a calculated BDAT treatment standard of 8 ppb as shown in Table 4-173.

TABLE 4-116
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,4,5-TRICHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
Gr/Rem	Full	WI0029149			4	8.000			NPDES

2,4,6-Trichlorophenol. The data available for the semivolatile constituent 2,4,6-trichlorophenol were compiled from the NPDES database and WERL database. Demonstrated treatment technologies included AS, BT, and RO. The technology size included full and pilot-scale. The resulting effluent concentrations ranged from 0.01 ppb to 7,150 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 1 ppb. AS was selected based on being a well documented treatment technology for wastewater. Of the data presented, the only full-scale data were for AS treatment. BDAT standard was set using 1 ppb, the detection limit for 2,4,6-trichlorophenol using EPA approved analytical methods.

The resulting BDAT treatment standard for 2,4,6-tricholorophenol is 8 ppb as shown in Table 4-173.

TABLE 4-117
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,4,6-TRICHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		PA0033367			1	10.000			NPDES
		PA0036650			6	5.170			NPDES
		AR0038512			25	3083.510			NPDES
		PA0008231			7	7150.000			NPDES
		LA0065501			6	10.000			NPDES
		AR0038512			20	1294.810			NPDES
		CT0001341			30	398.000			NPDES
		MI0000868			8	2.000			NPDES
		PA0008231			1	10.000			NPDES
		LA0066214			15	10.000			NPDES
		NJ0005134			16	37.847			NPDES
AS	Full	375E		0-100	7	0.070		42	WERL
AS	Full	375E		0-100	7	0.040		60	WERL
BT	Full	PA0028247			25	11.520			NPDES
BT	Full	LA0038245			38	10.486			NPDES
BT	Full	NY0026042			3	5.000			NPDES
BT	Full	MI0022276			22	0.635			NPDES
RO	Pilot	180A		0-100		0.010		98	WERL

Tris(2,3-dibromopropyl)phosphate. For the semivolatile constituent tris(2,3-dibromopropyl)phosphate (U235) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was bromomethane, Third Third Group IIIA2e. Using a transfer from this constituent results in a BDAT of AS for tris(2,3-dibromopropyl)phosphate and a calculated BDAT treatment standard of 80 ppb as shown in Table 4-173.

Acrylamide. For the semivolatile constituent acrylamide no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was aniline, Third Third Group IIIA3f(2). Using a transfer from this constituent results in a BDAT of LL+SS+AC for acrylamide and a calculated BDAT treatment standard of 1,042 ppb as shown in Table 4-173.

4.3 Metals

Antimony. For the metal constituent antimony, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AS, CAC, and L+Sed+Fil with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for antimony is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for antimony is 1,930 ppb.

TABLE 4-118
WASTEWATER TREATMENT PERFORMANE DATA
FOR ANTIMONY

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0–1000	6	58.000		59.00	WERL
AS	Full	975B		100–1000		59.000		66.00	WERL
AS	Full	201B		0–100	11	8.000		54.00	WERL
AS	Full	1B		0–100	2	6.000		68.00	WERL
AS	Full	1B		0–100	6	5.000		44.00	WERL
AS	Full	1B		0–100	6	2.000		60.00	WERL
AS	Full	1B		0–100	6	2.000		50.00	WERL
AS	Full	1B		0–100	4	14.000		72.00	WERL
AS	Full	1B		0–100	6	6.000		50.00	WERL
CAC (B)	Bench	638B		1000–10000	1	200.000		88.00	WERL
L+Sed	Full			8500		700.000			ITD–CMDB
L+Sed+Fil	Full			8500		470.000			ITD–CMDB

Arsenic. For the metal constituent arsenic , several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AL, AS, CAC, L+Sed+Fil, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for arsenic is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for arsenic is 1,390 ppb.

TABLE 4-119
WASTEWATER TREATMENT PERFORMANE DATA
FOR ARSENIC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	4	8,000		0.00	WERL
AS	Full	234A		0-100	7	3,000		50.00	WERL
AS	Full	234A		0-100	7	6,000		40.00	WERL
AS	Full	234A		0-100	7	8,000		50.00	WERL
AS	Full	234A		0-100	7	1,000		75.00	WERL
AS	Full	234A		0-100	7	1,000		89.00	WERL
AS	Full	201B		0-100	8	4,000		50.00	WERL
AS	Full	1B		0-100	6	4,000		50.00	WERL
AS	Full	1B		0-100	6	2,000		50.00	WERL
AS	Full	1B		0-100	6	2,000		50.00	WERL
AS	Full	1B		0-100	6	3,000		0.00	WERL
AS	Full	1B		0-100	5	2,000		33.00	WERL
AS	Full	975B		100-1000		83,000		27.00	WERL
CAC	Full	393A		0-100		6,300		34.00	WERL
CAC (B)	Bench	638B		0-100	1	8,000		87.00	WERL
CAC (B)	Bench	638B		100-1000	1	2,000		99.69	WERL
Chred/Pt+Sed+Fil	Full	K062		<100-3000	11	180,000			BDAT
L+Sed	Full			4200		510,000			ITD-CMDB
L+Sed+Fil	Full			4200		340,000			ITD-CMDB
TF	Full	1B		0-100	8	32,000		0.00	WERL

Barium. For the metal constituent barium, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AL, AS, RBC, L+Sed+Fil, and RBC with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for barium is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for barium is 1,150 ppb.

TABLE 4-120
WASTEWATER TREATMENT PERFORMANE DATA
FOR BARIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	6	47.000		78.00	WERL
AS	Full	1B		0-100	6	22.000		75.00	WERL
AS	Full	1B		0-100	6	12.000		72.00	WERL
AS	Full	1B		0-100	6	17.000		79.00	WERL
AS	Full	1B		0-100	6	54.000		48.00	WERL
AS	Full	1B		100-1000	6	17.000		88.00	WERL
AS	Full	1B		100-1000	6	48.000		62.00	WERL
AS	Full	1B		0-100	6	19.000		64.00	WERL
AS	Full	1B		100-1000	6	15.000		86.00	WERL
AS	Full	1B		0-100	6	23.000		73.00	WERL
AS	Full	1B		100-1000	6	2.000		98.30	WERL
AS	Full	1B		100-1000	6	38.000		65.00	WERL
AS	Full	201B		100-1000	35	30.000		75.00	WERL
AS	Full	1B		100-1000	6	94.000		61.00	WERL
AS	Full	1B		100-1000	6	44.000		63.00	WERL
AS	Full	1B		100-1000	6	34.000		88.00	WERL
AS	Full	1B		100-1000	6	41.000		71.00	WERL
AS	Full	1B		100-1000	4	180.000		67.00	WERL
AS	Full	1B		100-1000	6	67.000		61.00	WERL
AS	Full	1B		100-1000	6	18.000		95.50	WERL
AS	Full	1B		100-1000	6	59.000		82.00	WERL
AS	Full	1B		0-100	6	19.000		78.00	WERL
AS	Full	1B		100-1000	6	64.000		77.00	WERL
AS	Full	1B		0-100	6	29.000		71.00	WERL
AS	Full	1B		100-1000	6	46.000		62.00	WERL
AS	Full	1B		100-1000	6	34.000		69.00	WERL
AS	Full	1B		100-1000	6	16.000		86.00	WERL
AS	Full	1B		100-1000	6	18000.000		85.00	WERL
AS	Full	1B		0-100	6	21.000		72.00	WERL
AS	Full	1B		100-1000	6	32.000		75.00	WERL
AS	Full	1B		100-1000	6	58.000		61.00	WERL
AS	Full	1B		100-1000	6	31.000		89.70	WERL
AS	Full	1B		100-1000	6	100.000		44.00	WERL
AS	Full	1B		100-1000	6	43.000		75.00	WERL

TABLE 4-120
WASTEWATER TREATMENT PERFORMANE DATA
FOR BARIUM

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
L+Sed	Full			2800		420.000			ITD-CMDB
L+Sed+Fil	Full			2600		280.000			ITD-CMDB
RBC	Full	1B		100-1000	8	26.000		78.00	WERL
TF	Full	1B		0-100	8	33.000		39.00	WERL
TF	Full	1B		0-100	6	13,000		83.00	WERL
TF	Full	1B		0-100	6	32.000		68.00	WERL
TF	Full	1B		100-1000	6	72,000		52.00	WERL
TF	Full	1B		100-1000	8	120.000		62.00	WERL
TF	Full	1B		100-1000	6	110,000		21.00	WERL
TF	Full	1B		0-100	6	43,000		49.00	WERL
TF	Full	1B		100-1000	6	53,000		71.00	WERL
TF	Full	1B		100-1000	6	79.000		58.00	WERL
TF	Full	1B		100-1000	6	47,000		57.00	WERL
TF	Full	1B		0-100	6	17,000		80.00	WERL
TF	Full	1B		100-1000	8	140,000		39.00	WERL

Beryllium. For the metal constituent beryllium, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AS and L+Sed+Fil with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for Beryllium is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for beryllium is 820 ppb.

TABLE 4-121
WASTEWATER TREATMENT PERFORMANE DATA
FOR BERYLLIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	18		0-100	2	2.000		50.00	WERL
AS	Full	201B		0-100	6	1.000		75.00	WERL
L+Sed	Full			10240		300.000			ITD-CMDB
L+Sed+Fil	Full			10240		200.000			ITD-CMDB

Cadmium. For the metal constituent cadmium, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AS, CAC, ChOx/Pt, Fil, L+Sed+Fil, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for cadmium is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for cadmium is 200 ppb.

TABLE 4-122
WASTEWATER TREATMENT PERFORMANE DATA
FOR CADMIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	243A		0-100		0.300		90.90	WERL
AS	Full	234A		0-100	7	0.100		99.41	WERL
AS	Full	234A		0-100	7	0.100		99.47	WERL
AS	Full	234A		0-100	7	5.500		68.00	WERL
AS	Full	243A		0-100		1.000		85.00	WERL
AS	Full	201B		0-100	16	7.000		30.00	WERL
AS	Full	167E		0-100		1.000		95.20	WERL
AS	Full	1B		0-100	7	2.000		60.00	WERL
AS	Full	1B		0-100	6	7.000		86.00	WERL
AS	Full	234A		0-100	7	0.100		95.80	WERL
AS	Full	1B		0-100	6	2.000		87.00	WERL
AS	Full	1B		0-100	6	3.000		95.50	WERL
AS	Full	167E		0-100		1.000		90.90	WERL
AS	Full	1B		0-100	6	5.000		82.00	WERL
AS	Full	1B		0-100	6	2.000		80.00	WERL
AS	Full	167E		0-100		1.000		93.30	WERL
AS	Full	1B		0-100	7	5.000		58.00	WERL
AS	Full	1B		0-100	6	2.000		67.00	WERL
AS	Full	1B		0-100	6	6.000		40.00	WERL
AS	Full	1B		0-100	6	3.000		62.00	WERL
AS	Full	167E		0-100		1.000		97.80	WERL
AS	Full	975B		0-100		28.000		77.00	WERL
AS	Full	1B		1000-10000	6	65.000		94.10	WERL
AS	Full	1B		0-100	6	98.000		90.10	WERL
AS	Full	1B		0-100	6	15.000		91.20	WERL
CAC	Full	393A		0-100		5.300		44.00	WERL
CAC (B)	Full	638B		0-100	1	30.000		75.00	WERL
ChOx/Pt (B)	Bench	248A		10000-100000	1	900.000		91.30	WERL
ChOx/Pt (B)	Bench	248A		100000-1000000	1	800.000		99.65	WERL
ChPt	Full	245B		1000-10000	1	13.000		99.31	WERL
Fil	Pilot	254B		0-100	13	34.000		40.00	WERL
L+Sed	Full			100-3830		79.000			ITD-CMDB
L+Sed+Fil	Full			100-3830		49.000			ITD-CMDB
Pt+Sed	Full		5	0-21500	31	190.000			ITD-MF
Sed+Fil	Full			100-3830		10.000			ITD-CMDB
TF	Full	1B		0-100	6	16.000		76.00	WERL
TF	Full	1B		0-100	6	2.000		92.60	WERL

Chromium (Total). For the metal constituent chromium (total), several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AS, CAC, ChOx, ChPt, Fil, L+Sed+Fil, PACT, Sed, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for chromium (total) is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for chromium (total) is 370 ppb.

TABLE 4-123
WASTEWATER TREATMENT PERFORMANE DATA FOR CHROMIUM (TOTAL)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-10000	6	130,000		89.00	WERL
AS	Full	234A		0-100	7	7,000		84.00	WERL
AS	Full	1B		0-100	5	29,000		84.00	WERL
AS	Full	167E		0-100		9,000		72.00	WERL
AS	Full	1B		0-100	6	5,000		90.90	WERL
AS	Full	1B		0-100	7	22,000		89.00	WERL
AS	Full	234A		0-100	7	16,000		82.00	WERL
AS	Full	1B		0-100	6	6,000		85.00	WERL
AS	Full	167E		0-100		3,000		96.10	WERL
AS	Full	1B		0-100	6	12,000		76.00	WERL
AS	Full	243A		0-100		12,000		83.00	WERL
AS	Full	1B		0-100	6	36,000		82.00	WERL
AS	Full	1B		0-100	6	35,000		65.00	WERL
AS	Full	1B		0-100	6	6,000		89.00	WERL
AS	Full	1B		0-100	6	11,000		76.00	WERL
AS	Full	234A		0-100	7	34,000		58.00	WERL
AS	Full	1B		0-100	6	36,000		64.00	WERL
AS	Full	1B		0-100	6	24,000		70.00	WERL
AS	Full	198E		0-100	33	40,000		79.00	WERL
AS	Full	234A		0-100	7	3,000		94.80	WERL
AS	Full	234A		100-1000	7	14,000		89.00	WERL
AS	Full	1B		100-1000	6	16,000		87.00	WERL
AS	Full	1B		100-1000	6	40,000		76.00	WERL
AS	Full	243A		100-1000		28,000		77.00	WERL
AS	Full	1B		1000-10000	6	62,000		95.60	WERL
AS	Full	1B		100-1000	6	59,000		86.00	WERL
AS	Full	1B		100-1000	6	19,000		89.00	WERL
AS	Full	1B		100-1000	6	38,000		84.00	WERL
AS	Full	167E		100-1000		6,000		98.50	WERL
AS	Full	1B		100-1000	6	16,000		90.00	WERL
AS	Full	167E		100-1000		12,000		92.30	WERL

TABLE 4-123
WASTEWATER TREATMENT PERFORMANE DATA
FOR CHROMIUM (TOTAL)

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		100-1000	6	48.000		86.00	WERL
AS	Pilot	1294B		1000-10000	3	390.000		84.00	WERL
AS	Full	1B		100-1000	6	26.000		80.00	WERL
AS	Full	1B		1000-10000	6	110.000		97.40	WERL
AS	Full	1B		100-1000	6	52.000		82.00	WERL
AS	Full	1B		1000-10000	96	140.000		90.00	WERL
AS	Full	1B		100-1000	6	19.000		83.00	WERL
AS	Full	201B		100-1000	35	51.000		77.00	WERL
AS	Full	234A		100-1000	7	20.000		82.00	WERL
AS	Full	1B		100-1000	7	46.000		89.00	WERL
AS	Full	1B		100-1000	6	28.000		93.50	WERL
AS	Full	1B		100-1000	6	35.000		68.00	WERL
AS	Full	1B		100-1000	6	50.000		54.00	WERL
AS	Full	1B		100-1000	6	19.000		86.00	WERL
CAC	Full	393A		100-1000		40.000		94.10	WERL
CAC (B)	Bench	838B		100-1000	1	50.000		82.00	WERL
ChOx/Pt (B)	Bench	248A		1000-10000	1	0.500		74.00	WERL
ChPt	Full	245B		10000-100000	1	34.000		99.95	WERL
ChPt (B)	Pilot	254B		100-1000	16	77.000		76.00	WERL
ChPt (B)	Pilot	254B		10000-100000	14	170.000		99.86	WERL
ChPt+Fil (B)	Pilot	254B		10000-100000	14	47.000		99.91	WERL
ChPt+Fil (B)	Pilot	254B		100-1000	16	75.000		77.00	WERL
Chred/Pt+Sed+Fil	Full	K062		70-917000	9	57.000			BDAT
Chred/Pt+Sed+Fil	Full	K062		6000-7000000	11	135.000	68.0		BDAT
Fil	Pilot	254B		100-1000	14	39.000		90.20	WERL
L+Sed	Full			100-116000		84.000			ITD-CMDB
L+Sed+Fil	Full			100-116000		70.000			ITD-CMDB
PACT	Pilot	1294B		1000-10000	3	320.000		71.00	WERL
Pt+Sed	Full		50	0-35400	38	572.000			ITD-MF
Sed	Pilot	1294B		1000-10000	3	1100.000		66.00	WERL
Sed+Fil	Full			100-116000		80.000			ITD-CMDB
TF	Full	1B		100-1000	6	57.000		56.00	WERL
TF	Full	1B		100-1000	6	34.000		69.00	WERL
TF	Full	1B		0-100	6	15.000		67.00	WERL
TF	Full	1B		100-1000	6	92.000		23.00	WERL
TF	Full	1B		100-1000	6	180.000		25.00	WERL
TF	Full	1B		100-1000	6	44.000		71.00	WERL
TF	Full	1B		0-100	6	17.000		48.00	WERL

__Copper__. For the metal constituent copper, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AL, AS, CAC, ChOx, ChPt, L+Sed+Fil, RBC, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for copper is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for copper is 1,280 ppb.

TABLE 4-124
WASTEWATER TREATMENT PERFORMANE DATA
FOR COPPER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	8	13.000		90.70	WERL
AS	Full	1B		0-100	8	31.000		56.00	WERL
AS	Full	234A		0-100	7	1.000		98.90	WERL
AS	Full	1B		0-100	8	26.000		63.00	WERL
AS	Full	234A		0-100	7	1.000		98.20	WERL
AS	Full	1B		0-100	8	15.000		85.00	WERL
AS	Full	1B		0-100	6	12.000		83.00	WERL
AS	Full	1B		0-100	6	8.000		92.00	WERL
AS	Full	1B		0-100	8	3.000		88.00	WERL
AS	Full	198E		0-100	33	30.000		77.00	WERL
AS	Full	142A		0-100	14	10.000		86.00	WERL
AS	Full	167E		0-100		3.000		92.30	WERL
AS	Full	1B		0-100	6	44.000		56.00	WERL
AS	Full	201B		0-100	35	24.000		72.00	WERL
AS	Full	1B		0-100	8	2.000		90.00	WERL
AS	Full	1B		0-100	8	8.000		92.00	WERL
AS	Full	243A		0-100		10.000		84.00	WERL
AS	Full	1B		0-100	7	10.000		82.00	WERL
AS	Full	1B		0-100	6	17.000		63.00	WERL
AS	Full	234A		0-100	7	1.000		98.70	WERL
AS	Full	167E		100-1000		5.000		96.20	WERL
AS	Full	1B		100-1000	8	7.000		94.20	WERL
AS	Full	1B		100-1000	8	35.000		81.00	WERL
AS	Full	16		100-1000	6	28.000		90.30	WERL
AS	Full	1B		1000-10000	8	130.000		92.40	WERL
AS	Full	1B		100-1000	6	49.000		78.00	WERL
AS	Full	234A		100-1000	7	30.000		86.00	WERL
AS	Full	243A		100-1000		14.000		87.00	WERL
AS	Full	1B		100-1000	8	88.000		90.70	WERL
AS	Full	234A		100-1000	7	26.000		86.00	WERL
AS	Full	1B		100-1000	6	27.000		85.00	WERL
AS	Full	1B		100-1000	8	47.000		93.80	WERL
AS	Full	1B		100-1000	8	39.000		82.00	WERL
AS	Full	1B		100-1000	6	28.000		77.00	WERL
AS	Full	1B		100-1000	6	19.000		94.20	WERL
AS	Full	1B		100-1000	8	15.000		93.80	WERL
AS	Full	1B		100-1000	8	40.000		84.00	WERL
AS	Full	167E		100-1000		9.000		93.30	WERL
AS	Full	975B		1000-10000		82.000		97.50	WERL
AS	Full	1B		100-1000	6	81.000		90.00	WERL
AS	Full	1B		100-1000	8	5.000		96.90	WERL

TABLE 4-124
WASTEWATER TREATMENT PERFORMANE DATA
FOR COPPER

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	167E		100-1000		14.000		89.00	WERL
AS	Full	975B		1000-10000		4800.000		16.00	WERL
AS	Full	1B		100-1000	6	9.000		95.00	WERL
AS	Full	1B		100-1000	6	20.000		88.00	WERL
AS	Full	1B		100-1000	6	11.000		90.80	WERL
AS	Full	1B		100-1000	6	14.000		96.10	WERL
AS	Full	1B		100-1000	6	8.000		92.70	WERL
CAC	Full	393A		100-1000		130.000		66.00	WERL
CAC (B)	Bench	638B		100-1000		10.000		95.40	WERL
CAC (B)	Bench	638B		100-1000	1	220.000		73.00	WERL
CAC (B)	Bench	638B		100-1000	1	110.000		80.00	WERL
ChOx/Pt (B)	Bench	248A		100000-1000000	1	7800.000		93.70	WERL
ChOx/Pt (B)	Bench	248A		>1000000	1	1500.000		99.98	WERL
ChPt	Full	245B		1000-10000	1	150.000		97.70	WERL
ChPt	Pilot	254B		100000-1000000	8	910.000		99.63	WERL
ChPt (B)	Pilot	254B		100000-1000000	8	930.000		99.60	WERL
ChPt+Fil (B)	Pilot	254B		100000-1000000	8	120.000		99.95	WERL
ChPt+Fil (B)	Pilot	254B		100000-1000000	8	150.000		99.94	WERL
Chred/Pt+Sed+Fil	Full	K062		5000-865000	11	16520.000			BDAT
L+Sed	Full			100-108000		580.000			ITD-CMDB
L+Sed+Fil	Full			100-108000		390.000			ITD-CMDB
Pt+Sed	Full		20	0-500000	47	815.000			ITD-MF
RBC	Full	1B		0-100	6	2.000		94.90	WERL
Sed+Fil	Full			100-108000		50.000			ITD-CMDB
TF	Full	1B		100-1000	6	160.000		33.00	WERL
TF	Full	1B		100-1000	6	12.000		93.30	WERL
TF	Full	1B		100-1000	6	82.000		74.00	WERL
TF	Full	1B		100-1000	6	110.000		45.00	WERL
TF	Full	1B		100-1000	6	68.000		38.00	WERL
TF	Full	1B		100-1000	6	120.000		67.00	WERL
TF	Full	1B		0-100	6	12.000		48.00	WERL
TF	Full	1B		0-100	6	30.000		48.00	WERL
TF	Full	1B		0-100	6	25.000		57.00	WERL
TF	Full	1B		0-100	6	10.000		86.00	WERL
TF	Full	1B		100-1000	6	150.000		58.00	WERL

Lead. For the metal constituent lead, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AS, Chred, Fil, L+Sed+Fil, PACT, Sed, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for lead is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for lead is 280 ppb.

TABLE 4-125
WASTEWATER TREATMENT PERFORMANE DATA FOR LEAD

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		100-1000	6	88.000		57.00	WERL
AS	Full	1B		0-100	6	20.000		86.00	WERL
AS	Full	1B		0-100	6	20.000		86.00	WERL
AS	Full	201B		0-100	10	50.000		34.00	WERL
AS	Full	167E		100-1000		18.000		86.00	WERL
AS	Full	187E		0-100		17.000		73.00	WERL
AS	Full	234A		0-100	7	1.000		98.70	WERL
AS	Full	1B		0-100	6	50.000		50.00	WERL
AS	Full	187E		100-1000		12.000		90.20	WERL
AS	Full	234A		0-100	7	1.000		98.50	WERL
AS	Full	1B		1000-10000	6	59.000		95.10	WERL
AS	Full	187E		0-100		21.000		52.00	WERL
AS	Full	234A		0-100	7	0.000		98.00	WERL
AS	Full	1B		0-100	6	20.000		70.00	WERL
AS	Full	243A		0-100		5.400		88.00	WERL
AS	Full	201B		100-1000	6	70.000		50.00	WERL
AS	Full	234A		0-100	7	1.000		97.80	WERL
AS	Pilot	1294B		1000-10000	3	850.000		68.00	WERL
AS	Full	1B		0-100	6	44.000		52.00	WERL
AS	Full	1B		100-1000	6	25.000		86.00	WERL
AS	Full	1B		0-100	6	20.000		84.00	WERL
AS	Full	198E		0-100	33	40.000		50.00	WERL
AS	Full	1B		100-1000	6	70.000		50.00	WERL
AS	Full	243A		0-100		2.200		92.10	WERL
AS	Full	1B		100-1000	6	47.000		75.00	WERL
AS	Full	234A		0-100	7	1.000		97.80	WERL
AS	Full	1B		0-100	6	24.000		70.00	WERL
AS	Full	1B		100-1000	6	56.000		57.00	WERL
AS	Full	1B		100-1000	6	30.000		79.00	WERL
AS	Full	975B		100-1000		86.000		40.00	WERL
AS	Full	1B		100-1000	6	92.000		23.00	WERL
AS	Full	1B		100-1000	6	53.000		87.00	WERL
CAC	Full	393A		100-1000		32.000		87.00	WERL
Chred/Pt+Sed+Fil	Full	K062		10000-212000	11	10.000	78		BDAT
Fil	Pilot	254B		100-1000	14	100.000		83.00	WERL
L+Sed	Full			100-29200		120.000			ITD-CMDB
L+Sed+Fil	Full			100-29200		80.000			ITD-CMDB
PACT	Pilot	1294B		1000-10000	3	500.000		75.00	WERL
Pt+Sed	Full		100	0-42300	44	200.000			ITD-MF
Sed	Pilot	1294B		1000-10000	3	2000.000		78.00	WERL
Sed+Fil	Full			100-29200		30.000			ITD-CMDB
TF	Full	1B		0-100	6	20.000		75.00	WERL
TF	Full	1B		100-1000	8	130.000		19.00	WERL

Mercury. For the metal constituent mercury, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AS, CAC, L+Sed+Fil, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for mercury is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for mercury is 150 ppb.

TABLE 4-126
WASTEWATER TREATMENT PERFORMANE DATA
FOR MERCURY

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0-100	8	0.220		83.00	WERL
AS	Full	1B		0-100	8	0.200		82.00	WERL
AS	Full	1B		0-100	8	0.200		43.00	WERL
AS	Full	1B		0-100	6	0.230		92.80	WERL
AS	Full	1B		0-100	8	0.230		58.00	WERL
AS	Full	201B		0-100	19	0.300		35.00	WERL
AS	Full	1B		0-100	6	0.230		62.00	WERL
AS	Full	1B		0-100	6	0.450		82.00	WERL
AS	Full	1B		0-100	6	0.130		68.00	WERL
AS	Full	1B		0-100	6	1.000		41.00	WERL
AS	Full	1B		0-100	8	1.200		76.00	WERL
AS	Full	1B		0-100	7	0.400		0.00	WERL
AS	Full	1B		0-100	8	0.200		74.00	WERL
AS	Full	1B		0-100	8	0.200		78.00	WERL
AS	Full	1B		0-100	6	0.220		84.00	WERL
AS	Full	1B		0-100	8	0.300		52.00	WERL
AS	Full	1B		0-100	8	0.230		58.00	WERL
CAC	Full	393A		0-100		0.090		87.00	WERL
L+Sed	Full					60.000			ITD-CMDB
L+Sed+Fil	Full					38.000			ITD-CMDB
Sed+Fil	Full					30.000			ITD-CMDB
TF	Full	TF		0-100	6	0.570		37.00	WERL
TF	Full	1B		0-100	8	0.200		68.00	WERL
TF	Full	1B		0-100	6	0.200		43.00	WERL
TF	Full	1B		0-100	6	0.270		80.00	WERL
TF	Full	1B		0-100	8	0.430		31.00	WERL
TF	Full	1B		0-100	8	0.650		0.00	WERL
TF	Full	1B		0-100	8	0.300		48.00	WERL
TF	Full	1B		0-100	8	0.280		47.00	WERL

__Nickel__. For the metal constituent nickel, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AL, AS, CAC, ChOx, ChPt, L+Sed+Fil, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for nickel is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for nickel is 550 ppb.

TABLE 4-127
WASTEWATER TREATMENT PERFORMANE DATA
FOR NICKEL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	8	53,000		78.00	WERL
AS	Full	1B		0-100	8	25,000		34.00	WERL
AS	Full	1B		0-100	8	74,000		19.00	WERL
AS	Full	1B		1000-10000	8	200,000		82.00	WERL
AS	Full	234A		0-100	7	9.000		79.00	WERL
AS	Full	234A		0-100	7	1,000		94.40	WERL
AS	Full	167E		0-100		14,000		85.00	WERL
AS	Full	201B		0-100	27	88,000		34.00	WERL
AS	Full	167E		0-100		73,000		17.00	WERL
AS	Full	1B		0-100	7	20,000		33.00	WERL
AS	Full	243A		0-100		41,000		39.00	WERL
AS	Full	1B		0-100	6	70,000		19.00	WERL
AS	Full	1B		0-100	6	45,000		35.00	WERL
AS	Full	1B		0-100	6	82,000		16.00	WERL
AS	Full	1B		0-100	8	10,000		78.00	WERL
AS	Full	975B		100-1000		102,000		27.00	WERL
AS	Full	1B		0-100	8	17,000		29.00	WERL
AS	Full	975B		100-1000		80,000		50.00	WERL
AS	Full	1B		0-100	6	22,000		65.00	WERL
AS	Full	1B		100-1000	8	120,000		14.00	WERL
AS	Full	1B		0-100	8	36,000		34.00	WERL
AS	Full	1B		100-1000	8	120,000		25.00	WERL
AS	Full	1B		100-1000	8	56,000		49.00	WERL
AS	Full	1B		0-100	7	40,000		58.00	WERL
AS	Full	1B		100-1000	6	98,000		42.00	WERL
AS	Full	1B		0-100	6	44,000		19.00	WERL
AS	Full	1B		100-1000	7	13,000		88.00	WERL
AS	Full	234A		0-100		2,000		96.10	WERL
AS	Full	167E		100-1000	8	290,000		59.00	WERL
AS	Full	1B		0-100		10,000		83.00	WERL
AS	Full	167E		0-100		19,000		17.00	WERL
AS	Full	243A							

TABLE 4-127
WASTEWATER TREATMENT PERFORMANE DATA
FOR NICKEL

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0-100		74.000		19.00	WERL
AS	Full	1B		0-100	6	13.000		38.00	WERL
AS	Full	234A		100-1000	7	21.000		92.20	WERL
AS	Full	234A		100-1000	7	1.000		99.71	WERL
AS	Full	234A		100-1000	7	50.000		70.00	WERL
AS	Full	1B		100-1000	6	270.000		31.00	WERL
AS	Full	1B		100-1000	6	240.000		46.00	WERL
CAC	Full	393A		100-1000		120.000		20.00	WERL
CAC (B)	Bench	638B		100-1000	1	100.000		41.00	WERL
CAC (B)	Bench	638B		1000-10000	1	100.000		93.30	WERL
ChOx/Pt (B)	Bench	248A		>1000000	1	28000.000		99.43	WERL
ChOx/Pt (B)	Bench	248A		10000-100000	1	1900.000		91.10	WERL
ChPt	Full	245B		10000-100000	1	27.000		99.79	WERL
ChPt (B)	Pilot	254B		10000-100000	8	190.000		99.48	WERL
ChPt (B)	Pilot	254B		10000-100000	3	2300.000		84.00	WERL
ChPt (B)	Pilot	254B		1000-10000	17	500.000		58.00	WERL
ChPt (B)	Pilot	254B		1000-10000	16	75.000		93.40	WERL
ChPt (B)	Pilot	254B		100000-1000000	3	850.000		99.91	WERL
ChPt (B)	Pilot	254B		10000-100000	8	170.000		99.52	WERL
ChPt+Fil (B)	Pilot	254B		10000-100000	8	89.000		99.91	WERL
ChPt+Fil (B)	Pilot	254B		10000-100000	8	86.000		99.81	WERL
ChPt+Fil (B)	Pilot	254B		10000-100000	3	130.000		99.07	WERL
ChPt+Fil (B)	Pilot	254B		100000-1000000	3	220.000		99.97	WERL
ChPt+Fil (B)	Pilot	254B		1000-10000	17	490.000		59.00	WERL
Chred/Pt+Sed+Fil	Full	K062		4000-100310000	11	340.000	93.0		BDAT
L+Sed	Full			100-27500		740.000			ITD-CMDB
L+Sed+Fil	Full			100-27500		220.000			ITD-CMDB
Pt+Sed	Full		40	0-415000	45	942.000			ITD-MF
Sed+Fil	Full			100-27500		50.000			ITD-CMDB
TF	Full	1B		100-1000	6	70.000		36.00	WERL
TF	Full	1B		0-100	6	40.000		36.00	WERL
TF	Full	1B		0-100	6	58.000		0.00	WERL
TF	Full	1B		0-100	6	49.000		23.00	WERL

Selenium. For the metal constituent selenium, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AS, L+Sed+Fil, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for selenium is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for selenium is 820 ppb.

TABLE 4-128
WASTEWATER TREATMENT PERFORMANE DATA FOR SELENIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	5	3.000		40.00	WERL
AS	Full	1B		0-100	5	2.000		33.00	WERL
AS	Full	975B		0-100		12.000		40.00	WERL
AS	Full	1B		0-100	6	3.000		0.00	WERL
AS	Full	201B		0-100	6	3.000		0.00	WERL
AS	Full	1B		0-100	4	2.000		33.00	WERL
L+Sed	Full			4200		300.000			ITD-CMDB
L+Sed+Fil	Full			4200		200.000			ITD-CMDB
TF	Full	1B		0-100	6	3.000		25.00	WERL

Silver. For the metal constituent silver, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AL, AS, L+Sed+Fil, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for silver is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for silver is 290 ppb.

TABLE 4-129
WASTEWATER TREATMENT PERFORMANE DATA
FOR SILVER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	8	2.000		80.00	WERL
AS	Full	975B		0-100		15.000		50.00	WERL
AS	Full	1B		0-100	8	2.000		94.10	WERL
AS	Full	201B		0-100	35	1.000		88.00	WERL
AS	Full	1B		0-100	8	5.000		50.00	WERL
AS	Full	1B		0-100	8	2.000		78.00	WERL
AS	Full	1B		0-100	8	3.000		87.00	WERL
AS	Full	1B		0-100	8	1.000		88.00	WERL
AS	Full	1B		0-100	8	1.000		86.00	WERL
AS	Full	1B		0-100	8	1.000		80.00	WERL
AS	Full	1B		0-100	8	5.000		71.00	WERL
AS	Full	1B		0-100	8	3.000		85.00	WERL
AS	Full	1B		0-100	8	5.000		67.00	WERL
AS	Full	1B		0-100	8	2.000		90.50	WERL
AS	Full	1B		0-100	8	3.000		81.00	WERL
AS	Full	1B		0-100	8	5.000		72.00	WERL
AS	Full	1B		0-100	8	1.000		90.90	WERL
L+Sed	Full			4700		100.000			ITD-CMDB
L+Sed+Fil	Full			4700		70.000			ITD-CMDB
Pt+Sed	Full		10	0-600000	21	98.000			ITD-MF
Sed+Fil	Full					50.000			ITD-CMDB
TF	Full	1B		0-100	8	2.000		90.00	WERL
TF	Full	1B		0-100	8	7.000		63.00	WERL
TF	Full	1B		0-100	8	8.000		47.00	WERL
TF	Full	1B		0-100	8	3.000		73.00	WERL

Thallium. For the metal constituent thallium, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AL, AS, BT, L+Sed, L+Sed+Fil, and Neut with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for thallium is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for thallium is 1,400 ppb.

TABLE 4-130
WASTEWATER TREATMENT PERFORMANE DATA FOR THALLIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NJ0053511			4	0.055			NPDES
		SC0035947			13	388847.000			NPDES
		OH0008839			9	52.973			NPDES
		PA0028964			20	39.000			NPDES
		OH0006812			9	27.167			NPDES
		PA0004839			1	10.000			NPDES
		NJ0053511			1	0.010			NPDES
		PA0025933			1	50.000			NPDES
		PA0027511			11	4.500			NPDES
		PA0023256			27	47.900			NPDES
		CT0001538			10	13.000			NPDES
		PA0011371			19	1.800			NPDES
		MA0001783			2	502.500			NPDES
		PA0008281			1	100.000			NPDES
		MA0001783			2	1000.000			NPDES
		PA0008281			1	100.000			NPDES
		MA0001783			2	1000.000			NPDES
		NJ0053511			1	0.100			NPDES
		MA0001783			2	1000.000			NPDES
		PA0013765			11	10.800			NPDES
		PA0008281			1	100.000			NPDES
		PA0004839			2	25.000			NPDES
		PA0023256			14	191.600			NPDES
		PA0011371			1	1.000			NPDES
		MA0001783			1	1000.000			NPDES
		MA0001783			1	5.000			NPDES
		MA0001783			1	1000.000			NPDES
		MA0001783			5	403.000			NPDES
		NJ0000191			1	10.000			NPDES
		NY0177482			1	10.000			NPDES
		NY0177482			42	8.790			NPDES
		NY0201421			3	18.870			NPDES
		NY0000558			3	13.300			NPDES
		LA0065501			6	55.000			NPDES
		LA0066214			15	61.022			NPDES

TABLE 4-130
WASTEWATER TREATMENT PERFORMANE DATA
FOR THALLIUM

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	1	5,000		50.00	WERL
AS	Full	1B		0-100	1	1,000		75.00	WERL
AS	Full	975B		0-100		5,000		89.00	WERL
AS	Full	1B		0-100	6	1,000		0.00	WERL
AS	Full	201B		0-100	8	1,000		0.00	WERL
AS	Full	1B		0-100	2	1,000		0.00	WERL
BT	Full	PA0008800			8	118,000			NODES
BT	Full	WI0024597			3	2,000			NPDES
BT	Full	PA0028549			21	2,200			NPDES
BT	Full	WI0003820			2	20,000			NPDES
BT	Full	PA0028786			8	39,500			NPDES
BT	Full	PA0027031			19	9,700			NPDES
BT	Full	LA0038245			40	48,075			NPDES
BT+Fil	Full	IN0022829			12	204,000			NPDES
L+Sed	Full					500,000			ITD-CMDB
L+Sed+Fil	Full					340,000			ITD-CMDB
Neut	Full	WI0001040			4	1,000			NPDES
Sed+COAG	Full	WI0000311			3	1667,000			NPDES

Vanadium. The data available for the metal constituent vanadium were compiled from the WERL database. Demonstrated treatment technologies included AL, AS, ChPt, and TF. The technology size included full scale data. The resulting effluent concentrations ranged from 2.0 ppb to 190.0 ppb.

The BDAT standard was set using the ChPt technology and an achievable effluent of 3.0 ppb. ChPt was selected as BDAT since the ChPt data represent substantial treatment by a full scale demonstrated technology. In addition, ChPt showed the best % removal and the highest influent concentrations.

The resulting BDAT treatment standard for vanadium is 42 ppb as shown in Table 4-173.

TABLE 4-131
WASTEWATER TREATMENT PERFORMANE DATA
FOR VANADIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MI0025135			12	1366.700			NPDES
		VA0004103			1	200.000			NPDES
		VA0004103			16	200.000			NPDES
		MI0025135			19	17488.400			NPDES
		AR0000523			57	60947.400			NPDES
		NY0008231			20	1676.400			NPDES
		NY0005908			29	3591.400			NPDES
		NY0104213			25	324.000			NPDES
		NY0005932			14	13257.100			NPDES
		NY0104213			1	500.000			NPDES
		NY0005711			9	53.300			NPDES
		NY0002186			2	1766.000			NPDES
		NY0008262			16	538.500			NPDES
		NY0005908			22	444.100			NPDES
		NY0005932			30	2041.700			NPDES
		NY0005711			3	53.300			NPDES
		NY0008010			13	893.100			NPDES
		NY0107522			3	133.300			NPDES
		NY0110043			3	10.000			NPDES
		NY0166458			8	82.500			NPDES
		NY0002186			10	3227.000			NPDES
		LA0005347			2	300.000			NPDES
		NY0005941			30	2610.000			NPDES
		NY0005959			30	3002.900			NPDES
		NY0104213			16	319.400			NPDES
		CA0047953			1	20.000			NPDES
		CA0004961			15	106.311			NPDES
		CA0005096			30	70.000			NPDES
		CA0005789			30	1627.000			NPDES
		TX0004869			45	2046.890			NPDES
		TX0007072			1	1.000			NPDES
		TX0007072			9	55.000			NPDES
		TX0077593			58	583.450			NPDES

TABLE 4-131
WASTEWATER TREATMENT PERFORMANE DATA
FOR VANADIUM

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	4	5,000		38.00	WERL
AS	Full	1B		0-100	6	6,000		50.00	WERL
AS	Full	1B		0-100	4	10,000		23.00	WERL
AS	Full	1B		0-100	5	2,000		82.00	WERL
AS	Full	1B		0-100	4	11,000		21.00	WERL
AS	Full	1B		0-100	5	3,000		25.00	WERL
AS	Full	1B		0-100	4	29,000		59.00	WERL
AS	Full	201B		0-100	24	4,000		43.00	WERL
AS	Full	1B		0-100	4	2,000		75.00	WERL
AS	Full	1B		100-1000	6	130,000		7.00	WERL
AS	Full	1B		100-1000	6	190,000		10.00	WERL
BT	Full	CA0005053			32	181,000			NPDES
ChPt	Full	245B		1000-10000	1	3,000		99.72	WERL
FLOAT	Full	CA0005550			31	370,000			NPDES
S	Full	KY0001899			13	9378,800			NPDES
S	Full	LA0045233			23	7378,000			NPDES
TF	Full	1B		0-100	6	9,000		0.00	WERL

Zinc. For the metal constituent zinc, several sources of wastewater treatment performance data were available, including data from the ITD-CMDB WERL database, BDAT database, and ITD-MF database. Demonstrated treatment technologies included AL, AS, CAC, ChOx, ChPt, L+Sed+Fil, RBC, and TF with technology size including bench, pilot, and full-scale data.

The treatment performance data available form the ITD-CMDB were used as BDAT for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. This data are therefore a good reflection of the metals industry and its generic nature can better represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance.

The BDAT for zinc is L+Sed+Fil and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 4-173. The BDAT treatment standard for zinc is 1,020 ppb.

TABLE 4-132

WASTEWATER TREATMENT PERFORMANE DATA FOR ZINC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	6	93.000		90.00	WERL
AS	Full	1B		1000-10000	6	840.000		84.00	WERL
AS	Full	1B		1000-10000	6	38.000		98.70	WERL
AS	Full	1B		100-1000	6	57.000		64.00	WERL
AS	Full	234A		100-1000	7	180.000		62.00	WERL
AS	Full	1B		100-1000	6	110.000		82.00	WERL
AS	Full	1B		100-1000	6	64.000		64.00	WERL
AS	Full	1B		100-1000	6	47.000		79.00	WERL
AS	Full	167E		100-1000		9.000		97.80	WERL
AS	Full	1B		100-1000	6	220.000		55.00	WERL
AS	Full	1B		100-1000	7	52.000		81.00	WERL
AS	Full	1B		100-1000	6	30.000		87.00	WERL
AS	Full	1B		100-1000	6	17.000		84.00	WERL
AS	Full	1B		1000-10000	6	110.000		92.70	WERL
AS	Full	1B		1000-10000	6	270.000		83.00	WERL
AS	Full	1B		100-1000	7	90.000		65.00	WERL
AS	Full	1B		100-1000	6	44.000		84.00	WERL
AS	Full	1B		100-1000	6	130.000		84.00	WERL
AS	Full	1B		100-1000	6	55.000		84.00	WERL
AS	Full	1B		100-1000	6	51.000		81.00	WERL
AS	Full	167E		0-100		2.000		94.10	WERL
AS	Full	1B		100-1000	6	74.000		78.00	WERL
AS	Full	1B		100-1000	6	40.000		87.00	WERL
AS	Full	234A		1000-10000	7	50.000		98.90	WERL
AS	Full	1B		100-1000	6	130.000		66.00	WERL
AS	Full	1B		100-1000	6	37.000		79.00	WERL
AS	Full	1B		100-1000	6	57.000		86.00	WERL
AS	Full	1B		100-1000	6	94.000		81.00	WERL
AS	Full	198E		1000-10000	33	480.000		74.00	WERL
AS	Full	234A		1000-10000	7	10.000		99.25	WERL
AS	Full	1B		100-1000	6	130.000		44.00	WERL
AS	Full	1B		1000-10000	6	2600.000		64.00	WERL
AS	Full	243A		100-1000		99.000		78.00	WERL
AS	Full	1B		100-1000	6	200.000		75.00	WERL
AS	Full	1B		100-1000	6	90.000		89.00	WERL
AS	Full	234A		1000-10000	7	30.000		97.20	WERL
AS	Full	243A		100-1000		42.000		85.00	WERL
AS	Full	167E		100-1000		34.000		95.10	WERL
AS	Full	1B		100-1000	6	73.000		65.00	WERL

TABLE 4-132
WASTEWATER TREATMENT PERFORMANE DATA FOR ZINC

[continued]

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		100-1000	8	110,000		81.00	WERL
AS	Full	234A		0-100	7	10,000		75.00	WERL
AS	Full	142A		100-1000	14	100,000		75.00	WERL
AS	Full	167E		100-1000		10,000		94.10	WERL
AS	Full	201B		100-1000	35	100,000		72.00	WERL
AS	Full	1B		100-1000	8	66,000		74.00	WERL
AS	Full	1B		100-1000	8	36,000		90.30	WERL
AS	Full	1B		1000-10000	8	460,000		90.20	WERL
CAC	Full	393A		1000-10000		580,000		82.00	WERL
CAC (B)	Bench	638B		1000-10000		160,000		97.00	WERL
CAC (B)	Bench	638B		100-1000	1	180,000		55.00	WERL
CAC (B)	Bench	638B		100-1000		30,000		90.90	WERL
ChOx/Pt (B)	Bench	248A		1000-10000	1	1200,000		84.00	WERL
ChOx/Pt (B)	Bench	248A		1000-10000	1	1100,000		79.00	WERL
ChPt	Full	245B		10000-100000	1	22,000		99.93	WERL
ChPt (B)	Pilot	254B		100-1000	16	22,000		96.70	WERL
ChPt (B)	Pilot	254B		1000-10000	17	90,000		91.90	WERL
ChPt+Fil (B)	Pilot	254B		1000-10000	17	73,000		93.40	WERL
Chred/Pt+Sed+Fil	Full	K062		400-171000	11	245,000			BDAT
L+Sed	Full			100-337000		330,000			ITD-CMDB
L+Sed+Fil	Full			100-637000		230,000			ITD-CMDB
Pt+Sed	Full		5	0-18500000	34	548,000			ITD-MF
RBC	Full	1B		0-100	8	20,000		80.00	WERL
Sed+Fil	Full			100-337000		10,000			ITD-CMDB
TF	Full	1B		100-1000	8	110,000		42.00	WERL
TF	Full	1B		100-1000	8	56,000		73.00	WERL
TF	Full	1B		100-1000	8	81,000		32.00	WERL
TF	Full	1B		100-1000	8	34,000		87.00	WERL
TF	Full	1B		100-1000	8	94,000		72.00	WERL
TF	Full	1B		0-100	8	51,000		42.00	WERL
TF	Full	1B		100-1000	8	78,000		66.00	WERL
TF	Full	1B		100-1000	8	200,000		50.00	WERL
TF	Full	1B		100-1000	8	36,000		74.00	WERL
TF	Full	1B		0-100	8	77,000		16.00	WERL
TF	Full	1B		100-1000	8	74,000		38.00	WERL

4.4 Inorganics

Cyanide. The data available for cyanide were compiled from the BDAT, WERL, and ITD databases. Demonstrated treatment technologies included AL, AS, ChOx(Cl), ChOX/Pt, RBC, SS, TF, WOx, LL+SS, LL+SS+AC, L+S, L+S+F, and CN oxidation (CN/OX). The technology size included bench, pilot, and full-scale data. The resulting effluent concentrations ranged from 5.0 ppb to 39,000 ppb.

The BDAT standard was set using the CN/OX technology and an achievable effluent of 180.0 ppb. CN/OX was selected based on this technology's proven track record in the ITD metal finishing database as well as the fact that this full scale demonstrated treatment technology shows substantial treatment.

The average effluent concentration represented by the CMDB technologies may be more a reflection of dilution effects than actual treatment performance. Therefore, the metal finishing data were used as BDAT in lieu of the CMDB data.

The resulting BDAT treatment standard for cyanide is 1,200 ppb as shown in Table 4-173.

TABLE
WASTEWATER TREATMENT PERFORMANCE DATA FOR CYANIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	6	10,000		88	WERL
AS	Full	1B		100-1000	8	10,000		91.7	WERL
AS	Full	1B		100-1000	8	180,000		53	WERL
AS	Full	1B		100-1000	6	65,000		59	WERL
AS	Full	1B		100-1000	8	320,000		29	WERL
AS	Full	1B		100-1000	6	150,000		70	WERL
AS	Full	1B		0-100	6	27,000		67	WERL
AS	Full	201B		0-100	28	90,000		0	WERL
AS	Full	1B		100-1000	8	54,000		79	WERL
AS	Full	187E		0-100		19,000		44	WERL
AS	Full	1B		0-100	8	5,000		58	WERL
AS	Full	1B		100-1000	6	47,000		88	WERL
AS	Full	1B		100-1000	8	110,000		59	WERL
AS	Full	1B		100-1000	8	110,000		35	WERL
AS	Full	1B		1000-10000	8	110,000		97.7	WERL
AS	Full	1B		0-100	8	24,000		35	WERL
AS	Full	180A		100-1000	80	79,000		55	WERL
AS	Full	1B		1000-10000	6	130,000		91.9	WERL
AS	Full	187E		100-1000		20,000		88	WERL
AS	Full	1B		0-100	8	41,000		42	WERL
AS	Full	1B		100-1000	8	370,000		58	WERL
AS	Full	1B		0-100	7	6,000		65	WERL
AS	Full	201B		1000-10000	6	110,000		97.7	WERL
AS	Full	187E		100-1000		22,000		80	WERL
AS	Full	1B		100-1000	8	250,000		65	WERL
AS	Full	187E		100-1000		110,000		84	WERL
AS	Full	1B		1000-10000	8	240,000		80	WERL
AS	Full	1B		0-100	8	7,000		75	WERL
AS	Full	180A		0-100	80	8,000		91	WERL

TABLE 4-133
WASTEWATER TREATMENT PERFORMANCE DATA
FOR CYANIDE

(continued)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		1000-10000	6	220.000		90	WERL
AS	Full	1B		100-1000	8	87.000		84	WERL
AS	Full	1B		1000-10000	8	380.000		71	WERL
ChOx(Cl)	Pilot	1077B		10000-100000	20	8700.000		92.4	WERL
ChOx/Pt (B)	Bench	248A		>1000000	1	1000.000		100	WERL
ChOx/Pt (B)	Bench	248A		>1000000	1	100.000		100	WERL
CN/Ox	Full		5-20	45-1880000	1529	180.00			ITD-MF
LL+SS	Full	K103/K104		10-6280	5	2960.000	72		BDAT
LL+SS+AC	Full	K103/K104		10-6280	4	362.000	72		BDAT
L+Sed	Full			120-3280		70.00			ITD-CMDB
L+Sed+Fil	Full			120-3280		47.00			ITD-CMDB
RBC	Full	1B		1000-10000	6	84.000		95.8	WERL
SS	Pilot	1082E		10000-100000		38000.000		38	WERL
TF	Full	1B		100-1000	8	130.000		65	WERL
TF	Full	1B		100-1000	6	47.000		74	WERL
TF	Full	1B		100-1000	8	310.000		58	WERL
TF	Full	1B		100-1000	6	110.000		59	WERL
TF	Full	1B		0-100	6	17.000		39	WERL
TF	Full	1B		0-100	6	53.000		36	WERL
WOx	Pilot	780		100000-1000000		8000.000		98	WERL
WOx (B)	Bench	1054E		10000-100000		1200.000		98.7	WERL
WOx (B)	Bench	1054E		>1000000		170.000		100	WERL

Fluoride. The data available for fluoride were compiled from the BDAT, WERL, and ITD databases. Demonstrated treatment technologies included AAS, ChPt, RO, L+Sed, and L+Sed+Fil. The technology size included bench, pilot, and full-scale data. The resulting effluent concentrations ranged from 200 ppb to 14,500 ppb.

The BDAT standard was set using L+Sed technology and an achievable effluent of 14,500 ppb. L+Sed was selected as BDAT since these data represent ITD full scale treatment performance data from the CMDB. L+Sed shows equivalent substantial treatment to L+Sed+Fil.

The resulting BDAT treatment standard for fluoride is 35,000 ppb as shown in Table 4-173.

4-134
TABLE
WASTEWATER TREATMENT PERFORMANCE DATA
FOR FLUORIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AAS	Full	1264B		10000-100000		200.000		98.8	WERL
AAS	Full	12648		1000-10000		200.000		95.2	WERL
ChPt (B)	Bench	1313E		1000-10000		300.000		92.5	WERL
L+Sed	Full					14500.000			ITD-CMDB
L+Sed+Fil	Full					14500.000			ITD-CMDB
LL+SS+AC	Full	K103/K104		200	4	482.000			BDAT
RO	Pilot	180A		100-1000	18	210.000		74	WERL
RO	Full	12648		1000-10000		600.000		86	WERL
RO	Full	12648		1000-10000		500.000		88	WERL

Sulfide. The data available for sulfide were compiled from the BDAT and WERL databases. Demonstrated treatment technologies included ChOx(Ce), SS, LL+SS, and LL+SS+AC. The technology size included pilot and full-scale data. The resulting effluent concentrations ranged from 600 ppb to 8,000 ppb.

The BDAT standard was set using LL+SS technology and an achievable effluent of 1,000 ppb. LL+SS was selected as BDAT since these data were generated as part of a BDAT treatment test and show substantial treatment on a full scale level. LL+SS performance was equivalent to LL+SS+AC performance.

The resulting BDAT treatment standard for sulfide is 14,000 ppb as shown in Table 4-173.

4-135
TABLE
WASTEWATER TREATMENT PERFORMANCE DATA
FOR SULFIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
ChOx(Cl)	Pilot	1077B		10000-100000	15	600.000		97.5	WERL
LL+SS	Full	K103/K104		1000-89000	5	1000.000			BDAT
LL+SS+AC	Full	K103/K104		1000-89000	4	1000.000			BDAT
SS	Pilot	1082E		100000-1000000		8000.000		97.3	WERL

4.5 Organochlorine Pesticides

Aldrin. The data available for aldrin were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full scale BT. The resulting effluent concentration was 1.4919 ppb with a detection limit for aldrin established at 0.004 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 1.4919 ppb. BT was selected based on its full-scale treatment performance with a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for aldrin is 21 ppb as shown in Table 4-173.

4-136
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR ALDRIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0068214			15	1.0000			NPDES
		LA0065501			6	0.3500			NPDES
BT	Full	LA0038245			43	1.4919			NPDES

Alpha-BHC. The data available for alpha-BHC were compiled from the NPDES database and WERL database. Demonstrated treatment technologies included full-scale AS and GAC studies. The resulting effluent concentrations ranged from 0.010 ppb to 1.6053 ppb.

The BDAT standard was set using GAC technology and an achievable effluent of 0.01 ppb. The GAC data were selected based on being a full-scale study with an influent concentration range greater than 100 ppb. GAC was also the more efficient treatment technology of those documented.

The resulting BDAT treatment standard for alpha-BHC is 0.14 ppb as shown in Table 4-173.

4-137
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR ALPHA-BHC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0068214			15	1.0000			NPDES
		LA0065501			8	0.3500			NPDES
AS	Full	375E		0-100	7	0.0200		87	WERL
AS	Full	201B		0-100	1	1.0000		77	WERL
BT	Full	LA0038245			38	1.6053			NPDES
BT	Full	PA0026689			2	0.5000			NPDES
GAC	Full	237A		100-1000	1	0.0100		99.99	WERL

Beta-BHC. The data available for beta-BHC were compiled from the NPDES database and WERL database. Demonstrated treatment technologies included full-scale AS and GAC studies. The resulting effluent concentrations ranged from 0.010 ppb to 16.7 ppb.

The BDAT standard was set using GAC technology and an achievable effluent of 0.01 ppb. The GAC data were selected based on being a full-scale study with an influent concentration range greater than 100 ppb. GAC was also the more efficient treatment technology of those documented.

The resulting BDAT treatment standard for beta-BHC is 0.14 ppb as shown in Table 4-173.

4-138

TABLE

WASTEWATER TREATMENT PERFORMANE DATA

FOR BETA-BHC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	0.4000			NPDES
		LA0058882			32	15.0000			NPDES
		LA0058882			33	16.7000			NPDES
AS	Full	375E		0-100	7	0.0200		71	WERL
BT	Full	LA0038245			36	1.6053			NPDES
GAC	Full	237A		100-1000	1	0.0100		99.99	WERL

Delta-BHC. The data available for delta-BHC were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The resulting effluent concentrations of all the data documented ranged from 0.35 ppb to 15.3 ppb with a detection limit for delta-BHC established at 0.009 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 1.6320 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for delta-BHC is 23 ppb as shown in Table 4-173.

4-139
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR DELTA-BHC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0058882			32	15.0000			NPDES
		LA0065501			6	0.3500			NPDES
		LA0058882			33	15.3000			NPDES
BT	Full	LA0038245			38	1.6318			NPDES

Gamma-BHC. The data available for gamma-BHC were compiled from the NPDES database and the WERL database. Demonstrated treatment technologies included AL, AS, CAC, GAC, PACT, and TF. The technology size included full, pilot, and bench-scale. The resulting effluent concentrations ranged from 0.006 ppb to 99 ppb.

The BDAT standard was set using GAC technology and an achievable effluent of 0.12 ppb. The GAC data were selected based on being a full-scale study with an influent concentration range greater than 100 ppb. GAC was also the most efficient treatment technology documented.

The resulting BDAT treatment standard for gamma-BHC is 1.68 ppb as shown in Table 4-173.

4-140
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR GAMMA-BHC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		0-100	11	7.0000		82	WERL
AL	Pilot	203A		0-100	11	22.0000		44	WERL
AS	Full	375E		0-100	7	0.1100		39	WERL
AS	Full	375E		0-100	7	0.0700		36	WERL
AS	Pilot	240A		0-100	11	27.0000		59	WERL
AS	Pilot	203A		0-100	11	31.0000		20	WERL
AS	Full	375E		0-100	7	0.0210		81	WERL
AS	Pilot	204A		0-100	8	28.0000		44	WERL
AS	Bench	2008		100-1000	13	99.0000		8.3	WERL
AS	Full	375E		0-100	7	0.0800		88	WERL
AS	Full	201B		0-100	2	1.0000		66	WERL
BT	Full	PA0026247			21	0.0061			NPDES
CAC	Pilot	203A		0-100	11	32.0000		18	WERL
GAC	Full	237A		100-1000	1	0.1200		99.87	WERL
PACT	Bench	2008		100-1000	17	8.0000		92.1	WERL
TF	Full	375E		0-100	7	0.0600		14	WERL
TF	Full	375E		0-100	7	0.1100		58	WERL
TF	Pilot	240A		0-100	10	37.0000		46	WERL
TF	Pilot	203A		0-100	11	34.0000		13	WERL

Chlordane. The data available for chlordane were compiled from the NPDES database. The demonstrated treatment technologies was full-scale BT and pilot-scale Chred. The resulting effluent concentrations ranged from 0.01 ppb to 483 ppb, with a detection limit for chlordane established a 0.014 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 0.2336 ppb which represents the average of all BT effluent values (a value below the detection limit was set at the detection limit). BT was selected based on its full-scale performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for chlordane is 3.27 ppb as shown in Table 4-173.

TABLE 4-141
WASTEWATER TREATMENT PERFORMANE DATA
FOR CHLORDANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CA0107611			1	0.1000			NPDES
		CA0048216			5	132.0000			NPDES
		CA0037681			13	0.1000			NPDES
		CA0037661			29	0.1000			NPDES
		OH0058874			5	0.0200			NPDES
		LA0058882			33	15.9000			NPDES
		LA0085501			6	0.5000			NPDES
		LA0058882			32	15.6000			NPDES
		PA0026531			29	483.4500			NPDES
		CA0038598			5	0.1000			NPDES
		CA0048194			5	0.3420			NPDES
		CA0107417			8	0.0802			NPDES
BT	Full	CA0108031			1	0.0100			NPDES
BT	Full	LA0038245			38	1.6500			NPDES
BT	Full	CA0107395			5	0.2360			NPDES
BT	Full	CA0048160			3	0.0100			NPDES
BT	Full	TN0020711			22	0.0400			NPDES
BT	Full	CA0037737			4	0.0500			NPDES
BT	Full	CA0048143			2	0.1600			NPDES
BT	Full	CA0047998			1	0.0500			NPDES
BT	Full	CA0037494			2	0.1250			NPDES
BT	Full	CA0047881			1	0.0500			NPDES
BT	Full	CA0047364			3	0.0502			NPDES
BT	Full	CA0022756			1	0.5000			NPDES
BT	Full	CA0110604			9	0.1000			NPDES
Chred	Pilot			30	8	0.1000			ART

DDD. The data available for DDD were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The resulting effluent concentrations of all the data documented ranged from 1.0 ppb to 1.6238 ppb with a detection limit for DDD established at 0.011 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 1.6238 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for DDD is 23 ppb as shown in Table 4-173.

TABLE 4-142
WASTEWATER TREATMENT PERFORMANE DATA
FOR DDD

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0000345			2	1.0000			NPDES
		LA0065501			6	1.0000			NPDES
		LA0068214			15	1.0000			NPDES
BT	Full	LA0038245			42	1.6238			NPDES

DDE. The data available for DDE were compiled from the NPDES database and WERL database. The demonstrated treatment technologies included full-scale BT and Sed. The resulting effluent concentrations for all data documented ranged from 0.016 ppb to 2.229 ppb with a detection limit for DDE established at 0.004 ppb.

The BDAT standard was set using BT technology and an achievable effluent concentration of 2.229 ppb. BT was selected based on its full-scale treatment performance as a proven technology. Although the Sed data were also full-scale, the influent concentration was low and the removal efficiency did not represent substantial treatment.

The resulting BDAT treatment standard for DDE is 31 ppb as shown in Table 4-173.

TABLE 4-143
WASTEWATER TREATMENT PERFORMANE DATA
FOR DDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0000345			2	1.0000			NPDES
		LA0066214			15	1.0000			NPDES
		LA0065501			6	1.0000			NPDES
BT	Full	LA0038245			38	2.2290			NPDES
Sed	Full	981E		0-100	4	0.0160		33	WERL

DDT. The data available for DDT were compiled from the NPDES database. The demonstrated treatment technologies included BT and chemical conditioning followed by biological treatment Chemcon/BT. The technology size included full-scale data. The resulting effluent concentrations ranged from 0.0003 ppb to 102.0 ppb with a detection limit for DDT established at 0.012 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 0.28 ppb which represents the average of all BT effluent values (a value below the detection limit was set at the detection limit). BT was based on its full scale performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for DDT is 3.92 ppb as shown in Table 4-173.

TABLE 4-144
WASTEWATER TREATMENT PERFORMANE DATA FOR DDT

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CA0037681			29	0.1500			NPDES
		CA0038598			5	0.0480			NPDES
		CA0048003			1	0.2000			NPDES
		CA0048194			5	0.2440			NPDES
		CA0037681			13	0.0750			NPDES
		CA0107417			8	0.0802			NPDES
		CA0107611			1	0.0400			NPDES
		NY0000345			2	1.0000			NPDES
		LA0065501			6	1.0000			NPDES
		LA0066214			15	1.0000			NPDES
		CA0048216			5	102.0000			NPDES
BT	Full	CA0047384			3	0.0201			NPDES
BT	Full	CA0110604			9	0.0500			NPDES
BT	Full	LA0038245			37	1.5351			NPDES
BT	Full	CA0022756			1	0.5000			NPDES
BT	Full	CA0037494			2	0.0375			NPDES
BT	Full	CA0108031			1	0.0003			NPDES
BT	Full	CA0037737			3	0.0370			NPDES
BT	Full	CA0048143			2	0.0750			NPDES
BT	Full	CA0047996			1	0.0500			NPDES
BT	Full	CA0047681			1	0.5000			NPDES
Chem/Cond+BT	Full	WI0003077			2	0.0600			NPDES

Dieldrin. The data available for dieldrin were compiled from the NPDES database and the WERL database. Demonstrated treatment technologies included AS, BT, and Sed. The technology size included both full and pilot-scale. The resulting effluent concentrations ranged from 0.01 ppb to 95 ppb with a detection limit for dieldrin established at 0.002 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 1.198 ppb which is the average of the effluent concentrations for full-scale BT data. BT was selected being the more proven technology and the better treatment of the data documented.

The resulting BDAT treatment standard for dieldrin is 17 ppb as shown in Table 4-173.

TABLE 4-145
WASTEWATER TREATMENT PERFORMANE DATA
FOR DIELDRIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		AR0037800			48	10.0000			NPDES
		LA0058882			32	15.2000			NPDES
		LA0065501			6	0.1000			NPDES
		AR0037800			31	0.3352			NPDES
		LA0058882			33	15.5000			NPDES
		AR0037800			39	0.0100			NPDES
		AR0037800			3	0.0100			NPDES
		AR0037800			44	0.0100			NPDES
AS	Pilot	241B		100-1000	10	95.0000		86	WERL
BT	Full	LA0038245			38	1.5500			NPDES
BT	Full	PA0026247			25	0.8460			NPDES
Sed	Full	981E		0-100	5	0.0160		48	WERL

Endosulfan I. The data available for endosulfan I were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The resulting effluent concentrations of all the data documented ranged from 0.5 ppb to 1.71 ppb with a detection limit for endosulfan I established at 0.014 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 1.6711 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for endosulfan I is 23 ppb as shown in Table 4-173.

TABLE 4-146
WASTEWATER TREATMENT PERFORMANE DATA
FOR ENDOSULFAN I

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	1.7100			NPDES
		NY0000345			2	1.0000			NPDES
		NY0003338			1	0.0500			NPDES
		LA0066214			15	1.0000			NPDES
BT	Full	LA0038245			38	1.6711			NPDES

Endosulfan II. The data available for endosulfan II were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The resulting effluent concentrations of all the data documented ranged from 1.0 ppb to 2.0474 ppb with a detection limit for endosulfan II established at 0.004 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 2.0474 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for endosulfan II is 29 ppb as shown in Table 4-173.

TABLE 4-147
WASTEWATER TREATMENT PERFORMANE DATA
FOR ENDOSULFAN II

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0000345			2	1.0000			NPDES
		LA0065501			8	1.7500			NPDES
		LA0066214			14	1.0000			NPDES
BT	Full	LA0038245			38	2.0474			NPDES

Endrin. The data available for endrin were compiled from the NPDES database. Demonstrated treatment technology was full-scale BT. The resulting effluent concentrations ranged from 0.0003 ppb to 94 ppb with a detection limit for endrin established at 0.006 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 0.1992 ppb which represents the average of all BT effluent values (a value below detection limit was set at the detection limit). BT was selected based on its full-scale performance as a proven wastewater treatment technology. In addition, Bt is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for endrin is 2.79 ppb as shown in Table 4-173.

TABLE 4-148
WASTEWATER TREATMENT PERFORMANE DATA
FOR ENDRIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		AR0037800			3	0.0200			NPDES
		AR0037800			46	20.0000			NPDES
		AR0037800			43	0.0200			NPDES
		CA0037681			29	0.2900			NPDES
		CA0038598			5	0.0180			NPDES
		AR0037800			39	0.0200			NPDES
		AR0037800			31	0.6600			NPDES
		CA0037681			13	0.1000			NPDES
		LA0058882			32	15.0000			NPDES
		CA0048194			5	0.0560			NPDES
		CA0048216			5	94.0000			NPDES
		CA0107417			6	0.0801			NPDES
		CA0107611			1	0.0200			NPDES
		LA0058882			33	15.3000			NPDES
		LA0065501			6	0.1000			NPDES
BT	Full	CA0108031			1	0.0003			NPDES
BT	Full	CA0047998			1	0.0200			NPDES
BT	Full	CA0110604			9	0.0200			NPDES
BT	Full	CA0047364			3	0.0133			NPDES
BT	Full	CA0037737			4	0.0080			NPDES
BT	Full	CA0048143			2	0.1000			NPDES
BT	Full	CA0047881			1	0.2000			NPDES
BT	Full	CA0037494			2	0.0375			NPDES
BT	Full	CA0022756			1	0.5000			NPDES
BT	Full	LA0038245			38	1.0868			NPDES

Endrin Aldehyde. The data available for endrin aldehyde were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The resulting effluent concentrations of all the data documented ranged form 1.0 ppb to 1.8054 ppb with a detection limit for endrin aldehyde established at 0.023 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 1.8054 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for endrin aldehyde is 25 ppb as shown in Table 4-173.

TABLE 4-149
WASTEWATER TREATMENT PERFORMANE DATA
FOR ENDRIN ALDEHYDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	LA0066214			15	1.0000			NPDES
		LA0065501			6	1.7200			NPDES
		LA0038245			37	1.8054			NPDES

Heptachlor. The data available for heptachlor were compiled from the NPDES database and the WERL database. Demonstrated treatment technologies included AL, AS, CAC, GAC, and TF. The technology size included full and pilot-scale studies. The resulting effluent concentrations ranged form 0.01 ppb to 26 ppb.

The BDAT standard was set using GAC technology and an achievable effluent of 0.083 ppb. GAC was selected based on being the only full-scale study documented with an influent concentration greater than 100 ppb. An effluent concentration of 0.083 ppb was used to set the BDAT standard. This is the detection limit for heptachlor using EPA approved analytical procedures.

The resulting BDAT treatment standard for heptachlor is 1.16 ppb as shown in Table 4-173.

TABLE 4-150
WASTEWATER TREATMENT PERFORMANE DATA
FOR HEPTACHLOR

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0058882			33	15.3000			NPDES
		LA0058882			32	15.0000			NPDES
		LA0065501			8	0.1000			NPDES
		PA0026531			29	22.4140			NPDES
		FL0021881			3	0.0430			NPDES
AL	Pilot	203A		0-100	11	13.0000		87	WERL
AL	Pilot	203A		0-100	11	13.0000		67	WERL
AS	Pilot	240A		0-100	13	25.0000		68	WERL
AS	Pilot	203A		0-100	11	13.0000		67	WERL
AS	Pilot	204A		0-100	8	2.3000		92.8	WERL
BT	Full	LA0038245			39	1.7580			NPDES
BT	Full	PA0026247			25	0.8470			NPDES
CAC	Pilot	203A		0-100	11	14.0000		64	WERL
GAC	Full	237A		100-1000	1	0.0100		99.98	WERL
TF	Pilot	203A		0-100	11	18.0000		54	WERL
TF	Pilot	240A		0-100	12	28.0000		87	WERL

Heptachlor Epoxide. The data available for heptachlor epoxide were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The effluent concentrations of all the data presented ranged from 0.1 ppb to 16.5 ppb with a detection limit for heptachlor epoxide established at 0.083 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 1.145 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for heptachlor epoxide is 16 ppb as shown in Table 4-173.

TABLE 4-151
WASTEWATER TREATMENT PERFORMANE DATA
FOR HEPTACHLOR EPOXIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	0.1000			NPDES
		LA0058882			32	15.9000			NPDES
		LA0058882			33	16.5000			NPDES
BT	Full	LA0038245			38	1.1449			NPDES

Isodrin. For isodrin (P060) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was aldrin, Third Third Group IIIA2c(3)(e). Using a transfer from this constituent results in a BDAT of BT for isodrin and a calculated BDAT treatment standard of 21 ppb as shown in Table 4-173.

Kepone. For kepone (U142) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was toxaphene, Third Third Group IIIA2c(3)(a). Using a transfer from this constituent results in a BDAT of BT for kepone and a calculated BDAT treatment standard of 9.50 ppb as shown in Table 4-173.

Methoxyclor. The data available for methoxyclor were compiled from the WERL and NPDES databases. Demonstrated treatment technologies included BT and WOx. The technology size included full-scale data. The resulting effluent concentrations ranged from 0.01 ppb to 53.652 ppb with a detection limit for methoxyclor established at 0.176 ppb (see Table A-1).

The BDAT standard was set using the WOx technology and achievable effluent of 18 ppb. WOx was selected as BDAT since it represents a full scale demonstrated technology with substantial treatment for the constituent of concern. In addition, the WERL data showed a high influent concentration.

The resulting BDAT treatment standard for methoxyclor is 252 ppb as shown in Table 4-173.

TABLE 4-152
WASTEWATER TREATMENT PERFORMANE DATA
FOR METHOXYCLOR

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	OH0058874			5	0.0100			NPDES
		WV0000108			14	53.6520			NPDES
WOx	Full	780		1000-10000		18.0000		99.8	WERL

Toxaphene. The data available for toxaphene were compiled from the NPDES database. Demonstrated treatment technology was full-scale BT. Resulting effluent concentrations ranged form 0.05 ppb to 1,004 ppb with a detection limit for toxaphene established a 0.24 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 0.6781 ppb which represents the average of all BT effluent values (a value below detection limit was set at detection limit). BT was selected based on its full scale performance with a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for toxaphene is 9.50 ppb as shown in Table 4-173.

TABLE 4-153
WASTEWATER TREATMENT PERFORMANE DATA FOR TOXAPHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		OH0058874			5	0.2000			NPDES
		GA0003735			1	2.2000			NPDES
		CA0107611			1	0.1000			NPDES
		CA0048194			5	1.2520			NPDES
		CA0037681			13	0.5000			NPDES
		LA0058882			33	15.8000			NPDES
		CA0048216			5	1004.0000			NPDES
		LA0058882			32	15.8000			NPDES
		LA0065501			6	1.0000			NPDES
		MS0027995			8	444.0000			NPDES
		CA0107417			5	0.1001			NPDES
		GA0003735			39	1.3000			NPDES
		CA0037681			29	0.4000			NPDES
		CA0038598			5	0.7400			NPDES
BT	Full	CA0047881			1	2.0000			NPDES
BT	Full	CA0108031			1	0.1000			NPDES
BT	Full	CA0048143			2	0.4500			NPDES
BT	Full	CA0047996			1	0.0500			NPDES
BT	Full	CA0110804			9	0.0800			NPDES
BT	Full	CA0047364			3	0.3667			NPDES
BT	Full	CA0037737			4	0.1325			NPDES
BT	Full	CA0037494			2	0.2625			NPDES
BT	Full	CA0022758			1	1.0000			NPDES
BT	Full	LA0038245			38	1.7421			NPDES

4.6 Phenoxyacetic Acid Herbicides

2,4-Dichlorophenoxyacetic Acid. The data available for 2,4-dichlorophenoxyacetic acid were compiled from NPDES database and the BDAT database. Demonstrated treatment technologies included full-scale BT and chlorination (ChOx(Cl)). The resulting effluent concentrations ranged from 0.1 ppb to 30,432 ppb.

The BDAT standard was set using ChOx(Cl) technology and an achievable effluent of 51.5 ppb. ChOx(Cl) was selected based on being full-scale data developed for BDAT using BDAT standard procedures. BDAT data takes precedent over NPDES data.

The resulting BDAT treatment standard for 2,4-dichlorophenoxyacetic acid is 721 ppb as shown in Table 4-173.

TABLE 4-154
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,4-DICHLOROPHENOXYACETIC ACID

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		AR0038512			22	30431.800			NPDES
		AR0038512			20	13405.200			NPDES
		OH0058874			5	0.100			NPDES
BT	Full	LA0038245			37	910.030			NPDES
ChOx(Cl)	Full	K099	20	28900	2	51.500	98		BDAT
WOx	Pilot	Zimpro	11	74-43000	1	ND			WAO
WOx	Pilot	Zimpro	55	74-43000	1	ND			WAO
WOx	Pilot	Zimpro	55	74-43000	1	ND			WAO

Silvex. For silvex incomplete NPDES data were available from one facility. Due to a lack of information on this facility these data were not used to set BDAT. Therefore, treatment performance data were transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 2,4-dichlorophenoxyacetic acid, Third Third Group IIIA2c(3)(c). Using a transfer from this constituent results in a BDAT of ChOx(Cl) for silvex and a calculated BDAT treatment standard of 721 ppb as shown in Table 4-173.

TABLE 4-155
WASTEWATER TREATMENT PERFORMANE DATA
FOR SILVEX

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MID000888			9	3.778			NPDES

__2,4,5-T__. For 2,4,5-T incomplete NPDES data were available from four facilities. Based on the effluent concentrations, none of these data were believed to represent substantial treatment. Therefore, treatment performance data were transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 2,4-dichlorophenoxyacetic acid, Third Third Group IIIA2c(3)(c). Using a transfer from this constituent results in a BDAT of ChOx(Cl) for 2,4,5-T and a calculated BDAT treatment standard of 721 ppb as shown in Table 4-173.

4-156
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,4,5-T

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0108259			5	2.000			NPDES
		AR0038512			20	1232.000			NPDES
		AR0038512			25	1292.830			NPDES
BT	Full	LA0038245			40	703.930			NPDES

4.7 Organophosphorous Insecticides

Disulfoton. For disulfoton (P039) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was carbon disulfide, Third Third Group IIIA3g. Using a transfer from this constituent results in a calculated BDAT treatment standard for disulfoton of 770 ppb as shown in Table 4-173.

Famphur. For famphur (P097) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 4,6-dinitro-o-cresol, Third Third Group. Using a transfer from this constituent results in a BDAT of AC for famphur and a calculated BDAT treatment standard of 336 ppb as shown in Table 4-173.

Methyl Parathion. For methyl parathion (P071) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 4,6-dinitro-o-cresol, Third Third Group. Using a transfer from this constituent results in a BDAT of AC for methyl parathion and a calculated BDAT treatment standard of 336 ppb as shown in Table 4-173.

Parathion. For parathion (P089) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was 4-6-dinitro-o-cresol, Third Third Group. Using a transfer from this constituent results in a BDAT of AC for parathion and a calculated BDAT treatment standard of 336 ppb as shown in Table 4-173.

Phorate. For phorate (P094) no wastewater treatment performance data were available from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The transfer was based on structure and where a BDAT list constituent is represented by a U or P code, treatment performance data were taken from another U or P constituent in the same Third Third treatability group. The Third Third treatability groups are presented in Appendix B.

The constituent used to transfer treatment performance data was carbon disulfide, Third Third Group IIIA3g. Using a transfer from this constituent results in a calculated BDAT treatment standard for phorate of 770 ppb as shown in Table 4-173.

4.8 **PCBs**

Aroclor 1016. The data available for aroclor 1016 were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The effluent concentrations for all data presented ranged from 0.5 ppb to 4.033 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 0.911 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for aroclor 1016 is 13 ppb as shown in Table 4-173.

TABLE 4-157
WASTEWATER TREATMENT PERFORMANE DATA
FOR AROCLOR 1016

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0007129			5	0.500			NPDES
		LA0068214			15	1.000			NPDES
		LA0065501			6	0.500			NPDES
		TN0001520			3	4.033			NPDES
		NY0007129			3	0.500			NPDES
BT	Full	LA0038245			37	0.911			NPDES

Aroclor 1221. The data available for aroclor 1221 were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The effluent concentrations for all documented data ranged from 0.13 ppb to 15.3 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 1.018 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for aroclor 1221 is 14 ppb as shown in Table 4-173.

TABLE 4-158

WASTEWATER TREATMENT PERFORMANE DATA
FOR AROCLOR 1221

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			8	0.130			NPDES
		LA0058882			33	15.300			NPDES
		LA0058882			32	15.000			NPDES
		NY0007129			5	0.500			NPDES
		NY0007129			3	0.500			NPDES
BT	Full	LA0038245			39	1.018			NPDES

Aroclor 1232. The data available for aroclor 1232 were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The effluent concentrations of all data documented ranged from 0.5 ppb to 15.3 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 0.915 ppb. BT was selected based on its full scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for aroclor 1232 is 13 ppb as shown in Table 4-173.

TABLE 4-159
WASTEWATER TREATMENT PERFORMANE DATA
FOR AROCLOR 1232

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0058882			33	15.300			NPDES
		LA0058882			32	15.000			NPDES
		LA0065501			6	0.500			NPDES
		NY0007129			3	0.500			NPDES
		NY0007129			5	0.500			NPDES
BT	Full	LA0038245			39	0.915			NPDES

Aroclor 1242. The data available for aroclor 1242 were compiled from NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The effluent concentrations of all data documented ranged from 0.5 ppb to 15.3 ppb with a detection limit for aroclor 1242 established at 0.065 ppb (see Table A-1).

The BDAT standard was set using BT technology and an achievable effluent of 1.186 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for aroclor 1242 is 17 ppb as shown in Table 4-173.

TABLE 4-160

WASTEWATER TREATMENT PERFORMANE DATA
FOR AROCLOR 1242

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	0.500			NPDES
		LA0058892			31	12.280			NPDES
		NY0007129			3	0.593			NPDES
		NY0202037			29	0.500			NPDES
		NY0007226			7	0.823			NPDES
		LA0058882			33	15.300			NPDES
		NY0007129			5	0.812			NPDES
		NY0000586			12	1.433			NPDES
BT	Full	LA0038245			39	1.186			NPDES

Aroclor 1248. The data available for aroclor 1248 were compiled from the NPDES database. The demonstrated treatment technology presented for facility LA0038245 was full-scale BT. The effluent concentrations for all documented data ranged from 0.5 ppb to 15.3 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 0.928 ppb. BT was selected based on its full-scale treatment performance as a proven technology. In addition, BT is the only technology documented in the incomplete NPDES data.

The resulting BDAT treatment standard for aroclor 1248 is 13 ppb as shown in Table 4-173.

TABLE 4-161
WASTEWATER TREATMENT PERFORMANE DATA
FOR AROCLOR 1248

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0007129			3	0.500			NPDES
		LA0058882			33	15.300			NPDES
		LA0058882			31	12.280			NPDES
		LA0085501			8	0.920			NPDES
		NY0000588			12	1.433			NPDES
		NY0007129			5	0.500			NPDES
BT	Full	LA0038245			39	0.928			NPDES

Aroclor 1254. The data available for aroclor 1254 were compiled from the NPDES database and the WERL database. The demonstrated treatment technologies included AFF and BT. The technology size included both full and bench scale. Resulting effluent concentrations ranged from 0.36 ppb to 15.3 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 0.967 ppb. BT was selected based on a full-scale treatment performance as a proven technology. Although the NPDES data is not completely documented, the BT technology was substantiated by the bench-scale AFF data in WERL.

The resulting BDAT treatment standard for aroclor 1254 is 14 ppb as shown in Table 4-173.

4-162
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR AROCLOR 1254

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0058882			31	12.260			NPDES
		LA0065501			6	1.000			NPDES
		NY0007129			3	0.867			NPDES
		LA0058882			33	15.300			NPDES
		NY0007129			5	1.000			NPDES
AFF	Bench	70A		100-1000	19	11.000		98.9	WERL
AFF	Bench	70A		0-100	17	0.360		64	WERL
BT	Full	LA0038245			39	0.967			NPDES

Aroclor 1260. The data available for aroclor 1260 were compiled from the NPDES database and WERL database. The demonstrated treatment technologies included full-scale BT and Sed. The resulting effluent concentrations ranged form 0.028 ppb to 15.3 ppb.

The BDAT standard was set using BT technology and an achievable effluent of 0.967 ppb. BAT was selected based on its full-scale treatment performance as a proven technology. Although the Sed data were also full-scale, the influent concentration was low and the achieved effluent did not represent substantial treatment.

The resulting BDAT treatment standard for aroclor 1260 is 14 ppb as shown in Table 4-173.

TABLE 4-163
WASTEWATER TREATMENT PERFORMANE DATA
FOR AROCLOR 1260

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		IN0053384			1	0.500			NPDES
		IN0053384			43	0.580			NPDES
		PA0026682			2	0.500			NPDES
		LA0058882			33	15.300			NPDES
		NY0007129			5	1.000			NPDES
		LA0058882			31	12.280			NPDES
		LA0065501			8	1.000			NPDES
		NY0007129			3	0.833			NPDES
		IN0053384			1	0.500			NPDES
BT	Full	LA0038245			39	0.967			NPDES
Sed	Full	981E		0-100	5	0.028		52	WERL

4.9 Dioxins and Furans

Hexachlorodibenzo-p-Dioxins. The data available for hexachlorodibenzo-p-dioxins were compiled from the WERL database. The only documented treatment technology was dechlorination of toxics using an alkoxide formed by the reaction of potassium hydroxide with polyethylene (KPEG). The KPEG study was bench-scale with an effluent concentration of 2.1 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 0.00221 ppb. KPEG was not an assumed to be a proven technology and therefore was not considered for BDAT. AS technology was transferred from tetrachlorodibenzo-p-dioxin, a similarly structured compound. The effluent concentration was set using the detection limit for hexachlorodibenzo-p-dioxin (0.00221 ppb), as it was for tetrachlorodibenzo-p-dioxin.

The resulting BDAT treatment standard for hexachlorodibenzo-p-dioxin is 0.031 ppb as shown in Table 4-173.

TABLE 4-164
WASTEWATER TREATMENT PERFORMANE DATA
FOR HEXACHLORODIBENZO-p-DIOXINS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	2448		1000-10000	1	2.10000		99.93	WERL

Hexachlorodibenzofurans. The data available for hexachlorodibenzofurans were compiled from the WERL database. The only documented treatment technology was a bench-scale KPEG study with an effluent concentration of 0.76 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 0.00253 ppb. KPEG was not a assumed to be a proven technology and therefore was not considered for BDAT. AS technology was transferred from tetrachlorodibenzo-p-dioxin, a similarly structured compound. The effluent concentration was set using the detection limit for hexachlorodibenzofurans (0.00253 ppb), as it was for tetrachlorodibenzo-p-dioxin.

The resulting BDAT treatment standard for hexachlorodibenzofurnas is 0.035 ppb as shown in Table 4-173.

TABLE 4-165
WASTEWATER TREATMENT PERFORMANE DATA
FOR HEXACHLORODIBENZOFURANS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	2448		1000-10000	1	0.76000		99.98	WERL

Pentachlorodibenzo-p-dioxins. The data available for pentachlorodibenzo-p-dioxins were compiled from the WERL database. The only documented treatment technology was a bench-scale KPEG study with an effluent concentration of 0.36 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 0.00127 ppb. KPEG was not a assumed to be a proven technology and therefore was not considered for BDAT. AS technology was transferred from tetrachlorodibenzo-p-dioxin, a similarly structured compound. The effluent concentration was set using the detection limit for pentachlorodibenzo-p-dioxins (0.00127 ppb), as it was for tetrachlorodibenzo-p-dioxin.

The resulting BDAT treatment standard for pentachlorodibenzo-p-dioxins is 0.018 ppb as shown in Table 4-173.

TABLE 4-166
WASTEWATER TREATMENT PERFORMANE DATA
FOR PENTACHLORODIBENZO-p-DIOXINS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	2448		100-1000	1	0.36000		99.93	WERL

Pentachlorodibenzofurans. The data available for pentachlorodibenzofurans were compiled from the WERL database. The only documented treatment technology was a bench-scale KPEG study with an effluent concentration of 0.71 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 0.00164 ppb. KPEG was not a assumed to be a proven technology and therefore was not considered for BDAT. AS technology was transferred from tetrachlorodibenzo-p-dioxin, a similarly structured compound. The effluent concentration was set using the detection limit for pentachlorodibenzofurans (0.00164 ppb), as it was for tetrachlorodibenzo-p-dioxin.

The resulting BDAT treatment standard for pentachlorodibenzofurans is 0.023 ppb as shown in Table 4-173.

4-167

TABLE

WASTEWATER TREATMENT PERFORMANE DATA
FOR PENTACHLORODIBENZOFURANS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	2448		100-1000	1	0.71000		99.91	WERL

__Tetrachlorodibenzo-p-dioxins__. The data available for tetrachlorodibenzo-p-dioxins were compiled from the WERL database. Demonstrated treatment technologies included AS, GAC, and KPEG studies. The technology size included full and bench-scale. Resulting effluent concentrations ranged from 0.00001 ppb to 0.65 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 0.00044 ppb. Of the data presented, AS is the most proven treatment technology. The KPEG study in addition to being batch, bench-scale is a new technology without proven data on full-scale applicability. Therefore the decision was made to use the proven technology even when the influent concentration is less than 100 ppb. To set the standard, the detection limit for tetrachlorodibenzo-p-dioxin was used. The AS data substantiates that this level of treatment is achievable.

The resulting BDAT treatment standard for tetrachlorodibenzo-p-dioxins is 0.0062 ppb as shown in Table 4-173.

4-168
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR TETRACHLORODIBENZO-p-DIOXINS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	2538		0-100	1	0.00012		14	WERL
AS	Full	2538		0-100	1	0.00001		75	WERL
GAC	Full	2458		0-100		0.00067		93.6	WERL
KPEG (B)	Bench	2448		0-100	1	0.65000		97.7	WERL
KPEG (B)	Bench	2448		100-1000	1	0.37000		99.91	WERL

Tetrachlorodibenzofurans. The data available for tetrachlorodibenzofurans were compiled from the WERL database. The only documented treatment technology was a bench-scale KPEG study with an effluent concentration of 0.35 ppb.

The BDAT standard was set using AS technology and an achievable effluent of 0.00063 ppb. KPEG was not a assumed to be a proven technology and therefore was not considered for BDAT. AS technology was transferred from tetrachlorodibenzo-p-dioxin, a similarly structured compound. The effluent concentration was set using the detection limit for tetrachlorobenzofurans (0.00063 ppb), as it was for tetrachlorodibenzo-p-dioxin.

The resulting BDAT treatment standard for tetrachlorodibenzofurans is 0.0088 ppb as shown in Table 4-173.

4-169
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR TETRACHLORODIBENZOFURANS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	2448		100-1000	1	0.35000		99.78	WERL

__2,3,7,8-Tetrachlorodibenzo-p-dioxin__. The data available for 2,3,7,8-tetrachlorodibenzo-p-dioxin were compiled from the NPDES database. The only technology documented was full-scale BT with an effluent concentration ranging from 0.00000 ppb to 1,000 ppb.

The BDAT standard was set using AS technology and an achievable effluent concentration of 0.0044 ppb. The AS technology was selected based on transfer information from tetrachlorodibenzo-p-dioxin as well as it being a biological treatment process which substantiates the NPDES data. The effluent concentration was set using the detection limit for 2,3,7,8-tetrachlorodibenzo-p-dioxin as it was for tetrachlorodibenzo-p-dioxin.

The resulting BDAT treatment standard for 2,3,7,8-tetrachloridibenzo-p-dioxin is 0.0062 as shown in Table 4-173.

4-170
TABLE
WASTEWATER TREATMENT PERFORMANE DATA
FOR 2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		AR0038512			17	566.27000			NPDES
		LA0066214			15	0.10000			NPDES
		NJ0069414			7	1.00000			NPDES
		LA0065501			6	10.00000			NPDES
		PA0026379			1	10.00000			NPDES
		MI0000868			3	0.00000			NPDES
		AR0038512			11	0.03000			NPDES
BT	Full	LA0036245			34	10.28410			NPDES
BT	Full	PA0026549			1	1000.00000			NPDES

4.10 Calculation of BDAT Standards

The BDAT standards were calculated for each BDAT list constituent as shown in Table 4-173 at the end of this section. The long term averages for each constituent were multiplied by an accuracy correction factor (ACF) and a variability factor (VF) to account for analytical interferences and normal variations as described in Section 3.2.

The accuracy correction factors and variability factors for each constituent were determined as described below.

Volatile Constituents.

Analytical accuracy data were unavailable for most of the databases examined. Some analytical percent recoveries were presented in the BDAT database for the K104 codes and from the BDAT WAO treatment test. Those volatile constituents for which a percent recovery was available had their own accuracy correction factor calculated. The ACF was determined by dividing 100 by the lowest percent recovery. If a percent recovery was less than 20 percent it was not used. If a percent recovery was greater than 100 percent the recovery was set at 100 percent. Those volatile constituents with percent recovery data are shown in Table 4-171.

For those volatile constituents without percent recovery information, an average volatile ACF was determined. The average volatile ACF was determined from the average of the low percent recoveries for all other volatile constituents. Again, the ACF was equal to 100 divided by this percent recovery average. See Table 4-171 for this calculation.

In cases where the BDAT treatment standard was calculated for a constituent with an ITD limit, an accuracy correction factor was not used. In these cases the ITD variability factor was used in lieu of the ACF and the VF.

Semivolatile Constituents

As with the volatile constituents, analytical accuracy data were available from the BDAT data for a limited number of semivolatiles. Therefore, semivolatile constituents which had percent recovery information had an ACF calculated, see Table 4-172.

For those semivolatile constituents without percent recovery information, an average semivolatile ACF was determined. For semivolatiles the compounds can be classified as either acid or base neutrals, therefore two average ACF's were determined. See Table 4-172 for these calculations.

In cases where the BDAT treatment standard was calculated for a constituent with an ITD limit, an accuracy correction factor was not used. In these cases the ITD variability factor was used in lieu of the ACF and the VF.

All Other Constituents

Analytical accuracy data were unavailable for the other BDAT list constituents. In order to take analytical accuracy into account for those standards, a worse case ACF was used. The worse case ACF was based on a percent recovery of 20 percent (the lowest percent recovery BDAT methodology allows for use). The ACF then becomes 5 (100 divided by 20).

Variability Factors

Due to the nature of data gathered from the various data sources, in many cases original data points were not available. For example, ITD and WERL data were presented as medians or averages in the ITD development documents and WERL database. Therefore, it became impossible to determine an accurate variability factor for each constituent. To maintain consistency in how the data from different sources were handled, a single variability factor of 2.8 was used for all non-ITD BDAT standards.

For constituents whose BDAT treatment standard was set on an ITD limit (i.e., selected volatiles, semivolatiles, metals, and fluoride) the ITD variability factor was used.

TABLE 4-171
VOLATILE ACCURACY CORRECTION FACTOR CALCULATIONS

	PERCENT RECOVERY							
VOLATILES	WAO A		WAO B		K103/K104		LOW VALUE	ACF
n-Butanol	82	94	84	93			82	1.22
Isobutanol	97	92	102	89			89	1.12
Methanol	93	88	99	85			85	1.18
3-Chloropropionitrile	159	171	182	182			100	1
1,4-Dioxane	152	153	155	153			100	1
2-Ethoxyethanol	157	172	161	161			100	1
Ethylene oxide	103	37	50	22			22	4.55
Methacrylonitrile	150	158	165	169			100	1
Trichloroethene	87	89	87	88			87	1.15
1,1-Dichloroethene	108	110	120	120			100	1
Benzene	165	190	110	120	76	94	76	1.32
Chlorobenzene	98	110	88	88			88	1.14
Toluene			87	90			87	1.15
					AVERAGE		85.85	

VOLATILE ACF = 100/85.85 = 1.18

NOTES: If Percent Recovery is less than 20% that value is dropped from consideration.

If Percent Recovery is greater than 100% that recovery is set at 100%.

To determine an Accuracy Correction Factor (ACF) for volatiles, the average of all low values for volatile constituents is calculated. ACF = 100/ avg. low value.

TABLE 4-172
SEMIVOLATILE ACCURACY CORRECTION FACTOR CALCULATIONS

SEMIVOLATILES	WAO A		WAO B	K103/K104		LOW VALUE	ACF
Acid Neutrals							
p-Chloro-m-cresol	21	12	58			21	4.76
2-Chlorophenol	55	55	55			55	1.82
Pentachlorophenol	68	82	0			68	1.47
4-Nitrophenol	20	13	43			20	5
Phenol	94	82	42	21	26	21	4.76
				AVERAGE		37	

ACID NEUTRAL SEMIVOLATILES ACF = 100/37 = 2.7

Base Neutrals							
Acenaphthene	72	86	79			72	1.39
1,4-Dichlorobenzene	65	74	52			52	1.92
2,4-Dinitrotoluene	78	112	69			69	1.45
N-nitroso-di-n-propylamine	79	92	51			51	1.96
Pyrene	68	67	84			67	1.49
1,2,4-Trichlorobenzene	73	87	61			61	1.64
Nitrobenzene				115	116	100	1
Aniline				91	97	91	1.1
				AVERAGE		57.54	

BASE NEUTRAL SEMIVOLATILES ACF = 100/57.54 = 1.42

NOTES: If Percent Recovery is less than 20% that value is dropped from consideration.

If Percent Recovery is greater than 100% that recovery is set at 100%.

To determine an Accuracy Correction Factor (ACF) for semivolatiles, the average of all low values for each type (acid, base) is calculated. ACF = 100/ avg. low value.

TABLE 4- 173
BDAT TREATMENT STANDARDS FOR WASTEWATERS

CONSTITUENTS	LONG TERM AVG. (PPB)	ACF	VF	BDAT TRT. STANDARD (PPB)
Acetone	50	1.16	2.8	162
Acetonitrile	30	1.16	2.8	97
Acrolein	50	1.16	2.8	162
Acrylonitrile	50	NA	4.83045	242
Benzene	10	NA	13.5252	136
Bromodichloromethane	61	1.16	2.8	198
Bromomethane	20	1.16	2.8	65
n-Butyl alcohol	40	1.22	2.8	137
Carbon tetrachloride	10	1.16	2.8	32
Carbon disulfide	55	1.16	2.8	179
Chlorobenzene	10	1.14	2.8	32
2-Chloro-1,3-butadiene	10	1.16	2.8	32
Chlorodibromomethane	10	1.16	2.8	32
Chloroethane	50	NA	5.34808	268
2-Chloroethyl vinyl ether	10.811	1.16	2.8	35
Chloroform	12.208	NA	3.71334	46
Chloromethane	50	NA	3.79125	190
3-Chloropropylene	6.35	1.16	2.8	21
1,2-Dibromo-3-chloropropane	20	1.16	2.8	65
1,2-Dibromoethane	4.8	1.16	2.8	16
Dibromomethane	20	1.16	2.8	65
Trans-1,4-Dichloro-2-butene	6.35	1.16	2.8	21
Dichlorodifluoromethane	40	1.16	2.8	130
1,1-Dichloroethane	10	NA	5.88383	59
1,2-Dichloroethane	25.625	NA	8.22387	211
1,1-Dichloroethylene	10	NA	2.4723	25
Trans-1,2-Dichloroethylene	10	NA	5.34808	54
1,2-Dichloropropane	148.4	1.16	2.8	482
Trans-1,3-Dichloropropylene	6.35	1.16	2.8	21
cis-1,3-Dichloropropylene	6.35	1.16	2.8	21
1,4-Dioxane	10000	1	2.8	28000
Ethyl acetate	60	1.16	2.8	195
Ethyl benzene	10	1.16	2.8	32
Ethyl cyanide	7000	1.16	2.8	23000
Ethyl ether	20.5	1.16	2.8	67
Ethyl methacrylate	10	1.16	2.8	32
Ethylene oxide	10000	4.55	2.8	127400
Iodomethane	50	1.16	2.8	162
isobutyl alcohol	40	1.12	2.8	125
Methanol	10	1.18	2.8	33
Methyl ethyl ketone	5	1.16	2.8	16
Methyl isobutyl ketone	10	1.16	2.8	32
Methyl methacrylate	10	1.16	2.8	32
Methacrylonitrile	10000	1	2.8	28000
Methylene chloride	22.956	NA	3.88915	89
Pyridine	2.4	1.16	2.8	8
1,1,1,2-Tetrachloroethane	10	1.16	2.8	32
1,1,2,2-Tetrachloroethane	10	1.16	2.8	32

TABLE 4-173
BDAT TREATMENT STANDARDS FOR WASTEWATERS

CONSTITUENTS	LONG TERM AVG. (PPB)	ACF	VF	BDAT TRT. STANDARD (PPB)
Tetrachloroethylene	10.4231	NA	5.34808	56
Toluene	10	NA	7.9506	80
Tribromomethane	110	1.16	2.8	357
1,1,1-Trichloroethane	10	NA	5.34808	54
1,1,2-Trichloroethane	10	NA	5.34808	54
Trichloroethylene	10	NA	5.34808	54
Trichloromonofluoromethane	7	1.16	2.8	23
1,2,3-Trichloropropane	148.4	1.16	2.8	482
1,1,2-Trichloro-1,2,2-trifluoroethane	2000	1.16	2.8	6496
Vinyl chloride	50	NA	5.34808	268
1,2-Xylene	56	1.16	2.8	182
1,3-Xylene	56	1.16	2.8	182
1,4-Xylene	56	1.16	2.8	182
Acenaphthalene	10	NA	5.89125	59
Acenaphthene	10	NA	5.89125	59
Acetophenone	10361.56	1.42	2.8	41198
2-Acetylaminofluorene	10	1.42	2.8	40
4-Aminobiphenyl	24	1.42	2.8	95
Aniline	262	1.1	2.8	807
Anthracene	10	NA	5.89125	59
Aramite	5	1.42	2.8	20
Benz(a)anthracene	10	NA	5.89125	59
Benzal chloride	10	1.42	2.8	40
Benzenethiol	55	1.42	2.8	219
Benzo(a)pyrene	10.333	NA	5.89125	61
Benzo(b)fluoranthene	10	1.42	2.8	40
Benzo(ghi)perylene	1	1.42	2.8	4
Benzo(k)fluoranthene	10	NA	5.89125	59
p-Benzoquinone	5	1.42	2.8	20
Bis(2-chloroethoxy)methane	2	1.42	2.8	8
Bis(2-chloroethyl)ether	6	1.42	2.8	24
Bis(2-chloroisopropyl)ether	10.075	1.42	2.8	40
Bis(2-ethylhexyl)phthalate	47.133	NA	5.91768	279
4-Bromophenyl phenyl ether	10.05	1.42	2.8	40
Butyl benzyl phthalate	3	1.42	2.8	12
2-sec-Butyl-4,6-dinitrophenol	190	2.7	2.8	1436
p-Chloroaniline	11000	1.42	2.8	43736
Chlorobenzilate	18	1.42	2.8	72
p-Chloro-m-cresol	4	4.76	2.8	53
2-Chloronaphthalene	10.05	1.42	2.8	40
2-Chlorophenol	10	1.82	2.8	51
Chrysene	10	NA	5.89125	59
ortho-Cresol	25	2.7	2.8	189
para-Cresol	174	2.7	2.8	1315
Cyclohexanone	5	1.42	2.8	20
Dibenz(a,h)anthracene	10	1.42	2.8	40
Dibenzo(a,e)pyrene	10.333	1.42	2.8	41

TABLE 4- 173
BDAT TREATMENT STANDARDS FOR WASTEWATERS

CONSTITUENTS	LONG TERM AVG. (PPB)	ACF	VF	BDAT TRT. STANDARD (PPB)
m-Dichlorobenzene	3.6	1.42	2.8	14
o-Dichlorobenzene	16	1.42	2.8	64
p-Dichlorobenzene	16.33	1.92	2.8	88
3,3'-Dichlorobenzidine	24	1.42	2.8	95
2,4-Dichlorophenol	10	2.7	2.8	76
2,6-Dichlorophenol	10	2.7	2.8	76
Diethyl phthalate	42.5	NA	4.75981	203
3,3'-Dimethoxybenzidine	24	1.42	2.8	95
p-Dimethylaminoazobenzene	24	1.42	2.8	95
3,3'-Dimethylbenzidine	24	1.42	2.8	95
2,4-Dimethylphenol	10.794	NA	3.2565	36
Dimethyl phthlate	10	NA	4.63833	47
Di-n-butyl phthalate	17.606	NA	3.23768	57
1,4-Dinitrobenzene	58	1.42	2.8	231
4,6-Dinitro-o-cresol	24	NA	11.5417	277
2,4-Dinitrophenol	50	NA	2.45842	123
2,4-Dinitrotoluene	58	1.45	2.8	235
2,6-Dinitrotoluene	100	1.42	2.8	398
Di-n-octyl phthalate	3	1.42	2.8	12
Di-n-propylnitrosamine	73	1.96	2.8	400
Diphenylamine	95	1.42	2.8	378
Diphenylnitrosamine	73	1.42	2.8	290
1,2-Diphenylhydrazine	15.811	1.42	2.8	63
Fluoranthene	11.533	NA	5.89125	68
Fluorene	10	NA	5.89125	59
Hexachlorobenzene	10	1.42	2.8	40
Hexachlorobutadiene	10	1.42	2.8	40
Hexachlorocyclopentadiene	10.263	1.42	2.8	41
Hexachloroethane	10	1.42	2.8	40
Hexachlorophene	0.28	1.42	2.8	1.11
Hexachloropropylene	6.35	1.42	2.8	25
Indeno(1,2,3-cd)pyrene	1	1.42	2.8	4
Isosafrole	2400	1.42	2.8	9542
Methapyrilene	2400	1.42	2.8	9542
3-Methycholanthrene	1	1.42	2.8	4
4,4'-Methylenebis (2-chloraniline)	90	1.42	2.8	358
Methyl methanesulfonate	55	1.42	2.8	219
Naphthalene	10	NA	5.89125	59
1,4-Naphthoquinone	5	1.42	2.8	20
1-Naphthylamine	95	1.42	2.8	378
2-Naphthylamine	95	1.42	2.8	378
p-Nitroaniline	5	1.42	2.8	20
Nitrobenzene	14	NA	4.83045	68
4-Nitrophenol	50	NA	2.47783	124
N-Nitrosodi-n-butylamine	73	1.42	2.8	290
N-Nitrosodimethylamine	73	1.42	2.8	290
N-Nitrosomethylethylamine	73	1.42	2.8	290

TABLE 4-173
BDAT TREATMENT STANDARDS FOR WASTEWATERS

CONSTITUENTS	LONG TERM AVG. (PPB)	ACF	VF	BDAT TRT. STANDARD (PPB)
N-Nitrosomorpholine	73	1.42	2.8	290
N-Nitrosopiperidine	2.4	1.42	2.8	10
n-Nitrosopyrrolidine	2.4	1.42	2.8	10
5-Nitro-o-toluidine	58	1.42	2.8	230
Pentachlorobenzene	10	1.42	2.8	40
Pentachloroethane	10	1.42	2.8	40
Pentachloronitrobenzene	10	1.42	2.8	40
Pentachlorophenol	20	1.47	2.8	82
Phenacetin	2400	1.42	2.8	9542
Phenanthrene	10	NA	5.89125	59
Phenol	10.363	NA	2.49705	26
Phthalic anhydride	5	1.42	2.8	20
Pronamide	21	1.42	2.8	83
Pyrene	11.333	NA	5.89125	67
Resorcinol	5.5	2.7	2.8	42
Safrole	2400	1.42	2.8	9542
1,2,4,5-Tetrachlorobenzene	10	1.42	2.8	40
2,3,4,6-Tetrachlorophenol	6.8	2.7	2.8	51
1,2,4-Trichlorobenzene	10	1.64	2.8	46
2,4,5-Trichlorophenol	1	2.7	2.8	8
2,4,6-Trichlorophenol	1	2.7	2.8	8
Tris(2,3-dibromopropyl) phosphate	20	1.42	2.8	80
Acrylamide	262	1.42	2.8	1042
Antimony	470	NA	4.1	1930
Arsenic	340	NA	4.1	1390
Barium	280	NA	4.1	1150
Beryllium	200	NA	4.1	820
Cadmium	49	NA	4.1	200
Chromium(total)	70	NA	5.28	370
Copper	390	NA	3.28	1280
Lead	80	NA	3.5	280
Mercury	36	NA	4.1	150
Nickel	220	NA	2.5	550
Selenium	200	NA	4.1	820
Silver	70	NA	4.1	290
Thallium	340	NA	4.1	1400
Vanadium	3	5	2.8	42
Zinc	230	NA	4.43	1020
Cyanide	180	NA	6.68	1200
Fluoride	14500	NA	2.41	35000
Sulfide	1000	5	2.8	14000
Aldrin	1.49	5	2.8	21
alpha-BHC	0.01	5	2.8	0.14
beta-BHC	0.01	5	2.8	0.14
delta-BHC	1.632	5	2.8	23
gamma-BHC	0.12	5	2.8	1.68
Chlordane	0.2338	5	2.8	3.27

TABLE 4- 173
BDAT TREATMENT STANDARDS FOR WASTEWATERS

CONSTITUENTS	LONG TERM AVG. (PPB)	ACF	VF	BDAT TRT. STANDARD (PPB)
DDD	1.6238	5	2.8	23
DDE	2.229	5	2.8	31
DDT	0.28	5	2.8	3.92
Dieldrin	1.198	5	2.8	17
Endosulfan I	1.6711	5	2.8	23
Endosulfan II	2.0474	5	2.8	29
Endrin	0.1992	5	2.8	2.79
Endrin aldehyde	1.8054	5	2.8	25
Heptachlor	0.083	5	2.8	1.16
Heptachlor epoxide	1.145	5	2.8	16
Isodrin	1.49	5	2.8	21
Kepone	0.6781	5	2.8	9.5
Methoxyclor	18	5	2.8	252
Toxaphene	0.6781	5	2.8	9.5
2,4-Dichlorophenoxyacetic acid	51.5	5	2.8	721
Silvex	51.5	5	2.8	721
2,4,5-T	51.5	5	2.8	721
Disulfoton	55	5	2.8	770
Famphur	24	5	2.8	336
Methyl parathion	24	5	2.8	336
Parathion	24	5	2.8	336
Phorate	55	5	2.8	770
Aroclor 1016	0.911	5	2.8	13
Aroclor 1221	1.018	5	2.8	14
Aroclor 1232	0.915	5	2.8	13
Aroclor 1242	1.186	5	2.8	17
Aroclor 1248	0.928	5	2.8	13
Aroclor 1254	0.987	5	2.8	14
Aroclor 1260	0.987	5	2.8	14
Hexachlorodibenzo-p-dioxins	0.00221	5	2.8	0.031
Hexachlorodibenzofurans	0.00253	5	2.8	0.035
Pentachlorodibenzo-p-dioxins	0.00127	5	2.8	0.018
Pentachlorodibenzofurans	0.00164	5	2.8	0.023
Tetrachlorodibenzo-p-dioxins	0.00044	5	2.8	0.0062
Tetrachlorodibenzofurans	0.00063	5	2.8	0.0088
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.00044	5	2.8	0.0062

KEY: VF - VARIABILITY FACTOR
ACF = ACCURACY CORRECTION FACTOR

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APPENDIX A

METHOD DETECTION LIMITS

TABLE A-1
METHOD DETECTION LIMIT TABLE

KEY: NG = NOT GIVEN
ND = NOT DETERMINED
* = SYSTEM OR REAGENT BLANK DET. LIMIT

CONSTITUENTS	METHOD DL (PPB)	ANALYTICAL METHOD
Acetone	10	8240
Acetonitrile	*6.5	8240
Acrolein	NG	8240
Acrylonitrile	NG	8240
Benzene	0.5	8240
Bromodichloromethane	0.5	8240
Bromomethane	1	8240
n-Butyl alcohol	NG	8240
Carbon tetrachloride	0.5	8240
Carbon disulfide	0.5	8240
Chlorobenzene	0.5	8240
2-Chloro-1,3-butadiene	NG	8240
Chlorodibromomethane	0.5	8240
Chloroethane	1	8240
2-Chloroethyl vinyl ether	1	8240
Chloroform	0.5	8240
Chloromethane	1	8240
3-Chloropropylene	NG	8240
1,2-Dibromo-3-chloropropane	NG	8240
1,2-Dibromoethane	*4.8	8240
Dibromomethane	NG	8240
Trans-1,4-Dichloro-2-butene	NG	8240
Dichlorodifluoromethane	NG	8240
1,1-Dichloroethane	0.5	8240
1,2-Dichloroethane	0.5	8240
1,1-Dichloroethylene	0.5	8240
Trans-1,2-Dichloroethylene	0.5	8240
1,2-Dichloropropane	0.5	8240
Trans-1,3-Dichloropropylene	0.5	8240
cis-1,3-Dichloropropylene	0.5	8240
1,4-Dioxane	*10000	8240
Ethyl acetate	NG	8240
Ethyl benzene	0.5	8240
Ethyl cyanide	NG	8240
Ethyl ether	NG	8240
Ethyl methacrylate	NG	8240
Ethylene oxide	NG	8240
Iodomethane	NG	8240
isobutyl alcohol	NG	8240
Methanol	NG	8240
Methyl ethyl ketone	NG	8015
Methyl isobutyl ketone	NG	8015
Methyl methacrylate	NG	8240
Methacrylonitrile	NG	8240
Methylene chloride	0.5	8240
Pyridine	*2.4	8240

TABLE A-1
METHOD DETECTION LIMIT TABLE

KEY: NG = NOT GIVEN
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CONSTITUENTS	METHOD DL (PPB)	ANALYTICAL METHOD
1,1,1,2-Tetrachloroethane	NG	8240
1,1,2,2-Tetrachloroethane	0.5	8240
Tetrachloroethylene	NG	8240
Toluene	0.5	8240
Tribromomethane	NG	8240
1,1,1-Trichloroethane	0.5	8240
1,1,2-Trichloroethane	0.5	8240
Trichloroethylene	0.5	8240
Trichloromonofluoromethane	NG	8240
1,2,3-Trichloropropane	NG	8240
1,1,2-Trichloro-1,2,2-trifluorethane	NG	8240
Vinyl chloride	1	8240
1,2-Xylene	0.5	8240
1,3-Xylene	0.5	8240
1,4-Xylene	0.5	8240
Acenaphthalene	1	8270
Acenaphthene	1	8270
Acetophenone	NG	8270
2-Acetylaminofluorene	NG	8270
4-Aminobiphenyl	NG	8270
Aniline	NG	8270
Anthracene	1	8270
Aramite	NG	8270
Benz(a)anthracene	1	8270
Benzal chloride	NG	8270
Benzenethiol	NG	8270
Benzo(a)pyrene	1	8270
Benzo(b)fluoranthene	1	8270
Benzo(ghi)perylene	1	8270
Benzo(k)fluoranthene	1	8270
p-Benzoquinone	NG	8270
Bis(2-chloroethoxy)methane	1	8270
Bis(2-chloroethyl)ether	1	8270
Bis(2-chloroisopropyl)ether	1	8270
Bis(2-ethylhexyl)phthalate	1	8270
4-Bromophenyl phenyl ether	1	8270
Butyl benzyl phthalate	1	8270
2-sec-Butyl-4,6-dinitrophenol	0.07	8150
p-Chloroaniline	2	8270
Chlorobenzilate	NG	8270
p-Chloro-m-cresol	NG	8270
2-Chloronaphthalene	1	8270
2-Chlorophenol	1	8270
Chrysene	1	8270
ortho-Cresol	NG	8270
para-Cresol	NG	8270

TABLE A-1
METHOD DETECTION LIMIT TABLE

KEY: NG = NOT GIVEN
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CONSTITUENTS	METHOD DL (PPB)	ANALYTICAL METHOD
Cyclohexanone	NG	8270
Dibenz[a,h]anthracene	1	8270
Dibenzo[a,e]pyrene	NG	8270
m-Dichlorobenzene	1	8270
o-Dichlorobenzene	1	8270
p-Dichlorobenzene	1	8270
3,3'-Dichlorobenzidine	2	8270
2,4-Dichlorophenol	1	8270
2,6-Dichlorophenol	NG	8270
Diethyl phthalate	1	8270
3,3'-Dimethoxybenzidine	NG	8270
p-Dimethylaminoazobenzene	NG	8270
3,3'-Dimethylbenzidine	NG	8270
2,4-Dimethylphenol	1	8270
Dimethyl phthlate	1	8270
Di-n-butyl phthalate	1	8270
1,4-Dinitrobenzene	NG	8270
4,6-Dinitro-o-cresol	5	8270
2,4-Dinitrophenol	5	8270
2,4-Dinitrotoluene	1	8270
2,6-Dinitrotoluene	1	8270
Di-n-octyl phthalate	1	8270
Di-n-propylnitrosamine	NG	8270
Diphenylamine	NG	8270
Diphenylnitrosamine	NG	8270
1,2-Diphenylhydrazine	NG	8270
Fluoranthene	1	8270
Fluorene	1	8270
Hexachlorobenzene	1	8270
Hexachlorobutadiene	1	8270
Hexachlorocyclopentadiene	1	8270
Hexachloroethane	1	8270
Hexachlorophene	NG	8270
Hexachloropropylene	NG	8270
Indeno[1,2,3-cd]pyrene	1	8270
Isosafrole	NG	8270
Methapyrilene	NG	8270
3-Methycholanthrene	NG	8270
4,4'-Methylenebis [2-chloroaniline]	NG	8270
Methyl methanesulfonate	NG	8270
Naphthalene	1	8270
1,4-Naphthoquinone	NG	8270
1-Naphthylamine	NG	8270
2-Naphthylamine	NG	8270
p-Nitroaniline	5	8270
Nitrobenzene	1	8270

TABLE A-1
METHOD DETECTION LIMIT TABLE

KEY: NG = NOT GIVEN
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CONSTITUENTS	METHOD DL (PPB)	ANALYTICAL METHOD
4-Nitrophenol	5	8270
N-Nitrosodi-n-butylamine	NG	8270
N-Nitrosodimethylamine	NG	8270
N-Nitrosomethylethylamine	NG	8270
N-Nitrosomorpholine	NG	8270
N-Nitrosopiperidine	NG	8270
n-Nitrosopyrrolidine	NG	8270
5-Nitro-o-toluidine	NG	8270
Pentachlorobenzene	NG	8270
Pentachloroethane	NG	8270
Pentachloronitrobenzene	NG	8270
Pentachlorophenol	5	8270
Phenacetin	NG	8270
Phenanthrene	1	8270
Phenol	1	8270
Phthalic anhydride	NG	8270
Pronamide	NG	8270
Pyrene	1	8270
Resorcinol	NG	8270
Safrole	NG	8270
1,2,4,5-Tetrachlorobenzene	*1.5	8270
2,3,4,6-Tetrachlorophenol	NG	8270
1,2,4-Trichlorobenzene	1	8270
2,4,5-Trichlorophenol	1	8270
2,4,6-Trichlorophenol	1	8270
Tris(2,3-dibromopropyl) phosphate	NG	8270
Acrylamide		8270
Antimony	32	6010
Arsenic	1	7060
Barium	2	6010
Beryllium	0.3	6010
Cadmium	4	6010
Chromium(total)	7	6010
Copper	6	6010
Lead	1	7421
Mercury	0.2	7470/7471
Nickel	15	6010
Selenium	2	7740
Silver	7	6010
Thallium	1	7841
Vanadium	8	6010
Zinc	2	6010
Cyanide	NG	335.3
Fluoride	NG	340.2
Sulfide	100	9030
Aldrin	0.004	8080

TABLE A-1
METHOD DETECTION LIMIT TABLE

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* = SYSTEM OR REAGENT BLANK DET. LIMIT

CONSTITUENTS	METHOD DL (PPB)	ANALYTICAL METHOD
alpha-BHC	0.003	8080
beta-BHC	0.006	8080
delta-BHC	0.009	8080
gamma-BHC	0.004	8080
Chlordane	0.014	8080
DDD	0.011	8080
DDE	0.004	8080
DDT	0.012	8080
Dieldrin	0.002	8080
Endosulfan I	0.014	8080
Endosulfan II	0.004	8080
Endrin	0.006	8080
Endrin aldehyde	0.023	8080
Heptachlor	0.003	8080
Heptachlor epoxide	0.083	8080
Isodrin	NG	8080
Kepone	NG	8080
Methoxyclor	0.176	8080
Toxaphene	0.24	8080
2,4-Dichlorophenoxyacetic acid	1.2	8150
Silvex	0.17	8150
2,4,5-T	0.2	8150
Disulfoton	0.2	8140
Famphur	NG	8140
Methyl parathion	0.03	8140
Parathion	NG	8140
Phorate	0.15	8140
Aroclor 1016	ND	8080
Aroclor 1221	ND	8080
Arolor 1232	ND	8080
Aroclor 1242	0.065	8080
Aroclor 1248	ND	8080
Aroclor 1254	ND	8080
Aroclor 1260	ND	8080
Hexachlorodibenzo-p-dioxins	2.21 PPT	8280
Hexachlorodibenzofurans	2.53 PPT	8280
Pentachlorodibenzo-p-dioxins	1.27 PPT	8280
Pentalchlorodibenzofurans	1.64 PPT	8280
Tetrachlorodibenzo-p-dioxins	0.44 PPT	8280
Tetrachlorodibenzofurans	0.63 PPT	8280
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.44 PPT	8280

Detection Limits from:

1. SW846
2. Methods for Chemical Analysis of Water and Wastes
3. Reagent and system blanks from WAO Treatment Test

APPENDIX B

U AND P WASTES ARRANGED BY THIRD THIRD TREATABILITY GROUPS

APPENDIX B

WASTE TREATABILITY GROUPS

II.A.2.b.(3)
2 - Halogenated organics
b - Halogenated aliphatics
(3) - U's and P's in halogenated aliphatics

ANALYZABLES:

U044, Chloroform #14
U074, 1,4-Dichloro-2-butene #20 (trans) and #234 (cis)
U076, 1,1-Dichloroethane, #22
U077, 1,2-Dichloroethane, #23
U078, 1,1-Dichloroethylene, #24
U079, 1,2-Dichloroethylene, #25
U080, Methylene chloride #38
U083, 1,2-Dichloropropane, #26
U084, 1,3-Dichloropropene #27 (trans), #28 (cis)
U131, Hexachloroethane, #113
U184, Pentachloroethane, #137
U208, 1,1,1,2-Tetrachloroethane, #40
U209, 1,1,2,2-Tetrachloroethane, #41
U210, Tetrachloroethylene, #42
U211, Carbon tetrachloride, #7
U226, 1,1,1-Trichloroethane, #45
U227, 1,1,2-Trichloroethane, #46
U228, Trichloroethylene, #47
U243, Hexachloropropene, #115

III.A.2.c.(3).(a)
2 - Halogenated organics
c - Halogenated pesticides and chlorobenzenes
(3) - section discussing individual treatability groups
(a) - Chlorinated norbornane and norbornene derivatives

ANALYZABLES:

P004, Aldrin, #172
P037, Dieldrin, #181
P050, Endosulfan, #182 (I), #183 (II) and #238 (sulfate)
P051, Endrin, #184
P059, Heptachlor, #186
P060, Isodrin, #188
P123, Toxaphene, #191
U036, Chlordane, #177
U130, Hexachlorocyclopentadiene, #112
U142, Kepone, #189

III.A.2.c.(3).(b)
2 - Halogenated organics
c - Halogenated pesticides and chlorobenzenes
(3) - section discussing individual treatability groups
(b) - Chlorobenzenes

ANALYZABLES:

U037, Chlorobenzene, #9
U070, 1,2-Dichlorobenzene, #87
U071, 1,3-Dichlorobenzene, #86
U072, 1,4-Dichlorobenzene, #88
U127, Hexachlorobenzene, #110
U183, Pentachlorobenzene, #136
U185, Pentachloronitrobenzene, #130
U207, 1,2,4,5-Tetrachlorobenzene, #148

III.A.2.c.(3).(c)
2 - Halogenated organics
c - Halogenated pesticides and chlorobenzenes
(3) - section discussing individual treatability groups
(c) - Chlorophenoxycarboxylic acids and derivatives

ANALYZABLES:

U240, 2,4-D, #192

UNANALYZABLES:

U240, 2,4-D salts and esters (I)

III.A.2.c.(3).(d)
2 - Halogenated organics
c - Halogenated pesticides and chlorobenzenes
(3) - section discussing individual treatability groups
(d) - Chlorinated diphenyls

ANALYZABLES:

U038, Chlorobenzilate, #75
U060, DDD, #178
U061, DDT, #180
U132, Hexachlorophene, #114
U247, Methoxychlor, #190

III.A.2.c.(3).(e)
2 - Halogenated organics
c - Halogenated pesticides and chlorobenzenes
(3) - section discussing individual treatability groups
(e) - Lindane and hexachlorobutadiene

ANALYZABLES:

U128, Hexachlorobutadiene, #111
U129, Lindane, #176

III.A.2.d
2 - Halogenated organics
d - Halogenated phenolics

ANALYZABLES:

U039, p-Chloro-m-cresol, #76
U048, 2-Chlorophenol, #78
U081, 2,4-Dichlorophenol, #90
U082, 2,6-Dichlorophenol, #91

III.A.2.e
2 - Halogenated organics
e - Brominated organics

ANALYZABLES:

U029, Methyl bromide, #6
U030, 4-Bromophenyl phenyl ether, #71
U066, 1,2-Dibromo-3-chloropropane, #17
U067, Ethylene dibromide, #18
U068, Dibromomethane, #19
U225, Bromoform, #44

UNANALYZABLES:

P017, Bromoacetone (U)
U246, Cyanogen bromide (U)

III.A.2.f.(1)
2 - Halogenated organics
f - Miscellaneous halogenated organics
(1) - Chlorinated diphenyls

ANALYZABLES:

U073, 3,3'-Dichlorobenzidine, #89
U158, 4,4-Methylene-bis-(2-chloroaniline), #120

III.A.2.f.(2)
2 - Halogenated organics
f - Miscellaneous halogenated organics
(2) - Chlorinated polynuclear aromatics

ANALYZABLES:

U047, 2-Chloronaphthalene, #77

UNANALYZABLE

U026, Chloronaphazine (H)

III.A.2.f.(3)
2 - Halogenated organics
f - Miscellaneous halogenated organics
(3) - Chlorinated amides and amides

ANALYZABLES:

P024, p-Chloroaniline, #74
U192, Pronamide, #144

UNANALYZABLES:

P057, 2-Fluoroacetamide, (H)
U049, 4-Chloro-o-toluidine hydrochloride (M)
U097, Dimethyl carbonyl chloride, (U)
U222, o-Toluidine hydrochloride (M)

III.A.2.f.(4)
2 - Halogenated organics
f - Miscellaneous halogenated organics
(4) - Chlorinated methylbenzenes

ANALYZABLES:

U017, Benzal chloride, #218

UNANALYZABLES:

P028, Benzyl chloride (U)

III.A.2.f.(5)
2 - Halogenated organics
f - Miscellaneous halogenated organics
(5) - Halogenated aliphatics

ANALYZABLES:

U043, Vinyl chloride, #50
U045, Chloromethane, #15
U075, Dichlorodifluoromethane, #21

U121, Fluorotrichloromethane, #48
U138, Iodomethane, #32

UNANALYZABLES:

P027, 3-Chloroproprionitrile, (M)

III.A.2.f.(6)
2 - Halogenated organics
f - Miscellaneous halogenated organics
(6) - Halogenated aldehydes, ethers and esters

ANALYZABLES:

U024, bis-(2-Chloroethoxy)methane, #67
U025, Dichloroethyl ether, #68
U027, bis-(2-Chloroisopropyl)ether, #69
U042, 2-Chloroethyl vinyl ether, #13

UNANALYZABLES:

U034, Trichloroaceataldehyde (M)
U156, Methyl chlorocarbonate (M)
P016, bis-(Chloromethyl)ether (U)
P023, Chloroacetaldehyde (U)
P058, Fluoroacetic acid, Na salt (M)
P095, Phosgene (U)
U006, Acetyl chloride (U)
U033, Carbonyl Fluoride (U)
U041, n-Chloro-2,3-epoxypropane (U)
U046, Chloromethyl methyl ether (U)

III.A.2.f.(7)
2 - Halogenated organics
f - Miscellaneous halogenated organics
(7) - Chlorinated organosulfur

ANALYZABLES:

P026, 1-(o-Chlorophenyl)thiourea (H)
P113, Trichloromethanthiol (M)
U020, Benzenesulfonyl chloride (M)
U062, Diallate (H)

III.A.3.b
3 - Additional (non-halogenated) organics
b - Aromatics and other hydrocarbons

ANALYZABLES:

U019, Benzene, #4
U220, Toluene, #43
U239, Xylenes, #215, #216, #217

UNANALYZABLE:

U055, Cumene (M)
U056, Cyclohexane (M)
U0186, Pentadiene (M)

III.A.3.c
3 - Additional (non-halogenated) organics
c - Polynuclear aromatic hydrocarbons

ANALYZABLES:

U005, 2-Acetylaminofluorene, #54
U018, Benz(a)anthracene, #59
U022, Benzo(a)pyrene, #62
U050, Chrysene, #80
U063, Dibenzo(a,h)anthracene, #83
U120, Fluoranthene, #108
U137, Indeno(1,2,3-c,d)pyrene, #116
U157, 3-Methylcholanthrene, #119
U165, Naphthalene, #121

UNANALYZABLES:

U051, Creosote, Regulated with numerical standards for individual constitutents ... Naphthalene
Pentachlorophenol
Phennathrene
Pyrene
Toluene
Xylenes
Lead
U016, Benz(c)acridine (S)
U064, 1,2,7,8-Dibenzopyrene, (S)
U094, 7,12-Dimethylbenz(a)anthracene (S)

III.A.3.d
3 - Additional (non-halogenated) organics
d - Phenolics

ANALYZABLES:

P020, Dinoseb(2-sec-Butyl-4,6-dinitrophenol)
P047, 4,6-Dinitro-o-cresol and salts, #100
P048, 2,4-Dinitrophenol, #101
U052, Cresols, #81 (o-) and #82 (p-)
U101, 2,4-Dimethylphenol, #96
U170, 4-Nitrophenol, #127
U188, Phenol, #142
U201, Resorcinol, #146

UNANALYZABLES:

P034, 2-Cyclohexyl-4,6-dinitrophenol (S)

III.A.3.e
3 - Additional (non-halogenated) organics
e - Oxygenated hydrocarbons and heterocyclics

ANALYZABLES:

P003, Acrolein, #2
U002, Acetone, #222
U004, Acetophenone, #53
U031, N-Butanol, #223
U057, Cyclohexanone, #232
U108, 1,4-Dioxane, #29
U112, Ethyl acetate, #225
U117, Ethyl ether, #227
U118, Ethyl methacrylate, #31
U140, Isobutanol, #33
U154, Methanol, #228
U159, Methyl ethyl ketone, #34
U161, Methyl isobutyl ketone, #229
U162, Methyl methacrylate, #35
U166, 1,4-Naphthoquinone, #122
U197, p-Benzoquinone, #66

UNANALYZABLES:

P001, Warfarin (<0.3%) (H)
P005, Allyl alcohol (M)
P088, Endothall (H)
U123, Formic acid (H)
U248, Warfarin (>0.3%) (H)
P102, Propargyl alcohol (M)
U001, Acetaldehyde (M)
U008, Acrylic acid (M)
U124, Furan (M)
U125, Furfural (M)
U213, Tetrahydrofuran (M)
U085, 1,2,3,4-Diepoxybutane (M)
U113, Ethyl acrylate (M)
U122, Formaldehyde (M)
U053, Crotonaldehyde (U)
U126, Glycidaldehyde (U)
U147, Maleic anhydride (U)
U182, Paraldehyde (U)

III.A.3.f.(1)
3 - Additional (non-halogenated) organics
f - Organonitrogen compounds
(1) - Nitrogen heterocyclic compounds

ANALYZABLES:

U179, N-Nitrosopiperidine, #133
U180, N-Nitrosopyrrolidine, #134
U196, Pyridine, #39

UNANALYZABLES:

P008, 4-Aminopyridine
P018, Brucine (H)
P054, Ethyleneimine (Aziridine) (H)
P067, 2-Methylaziridine (H)
U011, Amitrole (H)
U148, Maleic hydrazide (H)
U191, 2-Picoline (M)

III.A.3.f.(2)
3 - Additional (non-halogenated) organics
f - Organonitrogen compounds
(2) - Amides and amines

ANALYZABLES:

U007, Acrylamide, #233
U012, Aniline, #56
U167, 1-Naphthylamine, #123
U168, 2-Naphthylamine, #124

UNANALYZABLES:

P046, alpha,alpha-Dimethylphenethylamine
P064, Isocyanic acid, methyl ester
U092, Dimethylamine (M)
U110, Dipropylamine (M)
U194, n-Propylamine (M)
U238, Ethyl carbamate (H)

III.A.3.f.(3)
3 - Additional (non-halogenated) organics
f - Organonitrogen compounds
(3) - Aminated diphenyls/biphenyls

ANALYZABLES:

U021, Benzidine, #61
U091, 3,3'-Dimethoxybenzidine, #93
U093, p-Dimethylaminoazobenzene, #94
U095, 3,3'-Dimethylbenzidine, #95

UNANALYZABLES:

U014, Auramine (H)
U236, Trypan blue (H)

III.A.3.f.(4)
3 - Additional (non-halogenated) organics
f - Organonitrogen compounds
(4) - Nitriles

ANALYZABLES:

P101, Propanenitrile (ethyl cyanide), #30
U003, Acetonitrile, #1
U009, Acrylonitrile, #3
U152, Methacrylonitrile, #37

UNANALYZABLES:

U149, Malonitrile (M)
P069, Methyllactonitrile (S)

III.A.3.f.(5)
3 - Additional (non-halogenated) organics
f - Organonitrogen compounds
(5) - Nitro compounds

ANALYZABLES:

P077, p-Nitroaniline, #125
U105, 2,4-Dinitrotoluene, #102
U106, 2,6-Dinitrotoluene, #103
U169, Nitrobenzene, #126
U181, 5-Nitro-o-toluidine, #135

UNANALYZABLES:

U234, sym-Trinitrobenzene (M)
U171, 2-Nitropropane, (M)

III.A.3.f.(6)
3 - Additional (non-halogenated) organics
f - Organonitrogen compounds
(6) - Nitroso compounds

ANALYZABLES:

P082, N-Nitrosodimethylamine, #130
U111, Di-n-propylnitrosoamine
U172, N-Nitroso-di-n-butylamine
U174, N-Nitrosodiethylamine

UNANALYZABLES:

P084, N-Nitrosomethylvinylamine (M)
U173, N-Nitroso-diethanolamine (M)
U176, N-Nitroso-N-ethylurea (M)
U177, N-Nitroso-N-methylurea (M)
U178, N-Nitroso-N-methylurethane (M)

III.A.3.g.
3 - Additional (non-halogenated) organics
g - Organosulfur compounds

ANALYZABLES:

P014, Thiophenol, #60
P022, Carbon disulfide, #8

UNANALYZABLES:

P002, 1-Acetyl, 2-thiourea (H)
P049, 2,4-Dithiobiuret (H)
P066, Methomyl (H)
P070, Aldicarb (H)
P072, 1-Naphthyl-2-thiourea (H)
P093, N-Phenylthiourea (H)
P116, Thiosemicarbazide (H)
U114, Ethylene bis-dithiocarbamic acid (H)
U116, Ethylene thiourea (H)
U193, 1,3-Propane sulfone (H)
U153, Methanethiol (M)
U218, Thioacetamide (H)
U219, Thiourea (H)
U244, Thiram (M)
P045, Thiofanox (S)
U119, Ethyl methane sulfonate (U)

III.A.3.h.
3 - Additional (non-halogenated) organics
h - Pharmaceutical compounds

ANALYZABLES:

P108, Strychnine and salts (8270)
U141, Isosafrole, #117
U155, Methapyrilene, #118
U187, Phenacetin, #140
U203, Safrole, #147

UNANALYZABLES

P007, 5-Aminoethyl 3-isoxazolol (muscimol) (H)
P042, Epinephrine (M)
P075, Nicotine and salts (H)

U010, Mitomycin C (H)
U015, Azaserine (H)
U035, Chlorambucil (H)
U059, Daunomycin (H)
U089, Diethylstilbestrol (H)
U143, Lasiocarpine (H)
U150, Melphalan (H)
U163, N-Methyl-, N-nitro-, N-nitroguanidine (M)
U164, Methylthiouracil (H)
U200, Reserpine (H)
U202, Saccharin and salts (H)
U206, Streptozotocin (H)
U090, Dihydrosafrole (S)
U237, Uracil mustard (S)

III.A.4.f.(1)
4 - Ignitable, corrosive and reactive
f - Potentially reactive U's and P's
(1) - Incinerable reactive organics and hydrazine derivatives

ANALYZABLES:

U096, alpha,alpha-Dimethyl benzyl hydroperoxide, #35
U109, 1,2-Diphenylhydrazine, #107

UNANALYZABLES:

P009, Ammonium picrate (M)
P081, Nitroglycerin (H)
U133, Hydrazine (M)
U086, N,N-Diethylhydrazine (S)
U160, Methyl ethyl ketone peroxide (S)
P068, Methyl hydrazine (U)
P112, Tetranitromethane (U)
U023, Benzotrichloride (U)
U098, 1,1-Dimethylhydrazine (U)
U099, 1,2-Dimethylhydrazine (U)
U103, Dimethyl sulfate (U)

III.A.4.f.(2)
4 - Ignitable, corrosive and reactive
f - Potentially reactive U's and P's
(2) - Incinerable organics

ANALYZABLES:

P096, Phosphine (M)
P105, Sodium azide (M)
U189, Phosphorus sulfide (M)
U249, Zinc phosphide (<10%) (U)
P006, Aluminum phosphide (U)
P122, Zinc phosphide (>10%) (U)
U135, Hydrogen sulfide (U)

III.A.4.f.(3)
4 - Ignitable, corrosive and reactive
f - Potentially reactive U's and P's
(3) - Fluorines

UNANALYZABLES:

U134 Hydrofluoric acid (U)
P056 Fluorine (U)

III.A.4.f.(1)
4 - Ignitable, corrosive and reactive
f - Potentially reative U's and P's
(4) - Recoverable metallics

ANALYZABLES:

P015 Beryllium dust, #157

UNANALYZABLES:

P073, Nickel carbonyl (I)
P087, Osmium tetroxide (U)

III.A.5.b
5 - Metals
b - Arsenic and Selenium

UNANALYZABLES:

P103, Selenourea (H)
U136, Cacodylic acid (H)
P036, Dichlorophenylarsine (S)
P038, Diethylarsine (S)
P010, Arsenic acid (U)
P011, Arsenic (V) oxide (U)
P012, Arsenic (III) oxide (U)
P114, Thallum selenite (U)
U204, Selenious acid (U)
U205, Selenium disulfide (U)

III.A.5.e
5 - Metals
e - Chromium

ANALYZABLES:

U032, Calcium chromate (U)

III.A.5.f
5 - Metals
f - Lead

UNANALYZABLES:

P110, Tetraethyl lead (I)
U144, Lead acetate (U)
U145, Lead phosphate (U)
U146, Lead subacetate (U)

III.A.5.g
5 - Metals
g - Mercury

ANALYZABLES:

U151, Mercury, #162

UNANALYZABLES:

P092, Phenylmercuric acetate (I)
P065, Mercury fulminate (S)

III.A.5.i
5 - Metals
i - Thallium

ANALYZABLES:

P113, Thallic oxide (U)
P114, Thallium selenite (U)
P115, Thallium (I) sulfate (U)
U214, Thallium (I) acetate (U)
U215, Thallium (I) carbonate (U)
U216, Thallium (I) chloride (U)
U217, Thallium (I) nitrate (U)

III.A.5.j
5 - Metals
j - Vanadium

METHOD

P119, Ammonium vanadate (U)
P120, Vanadium pentoxide (U)

III.A.6.m
m - gases

ANALYZABLES:

U115, Ethylene oxide, #214

UNANALYZABLES:

P076, Nitric oxide (U)
P078, Nitrogen dioxide (U)